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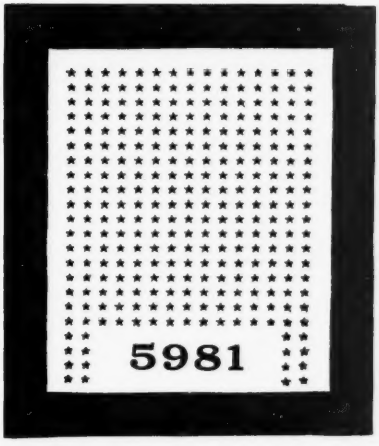

SERVICE FLAG NATIONAL DENTAL ASSOCIATION

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MAJOR C. VICTOR VIGNES, D.C., U.S.A., NEW ORLEANS, LA.
President National Dental Association.

THE JOURNAL
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Original Communications.

DEVELOPMENT OF THE DENTAL SERVICE DURING THE PRESENT WAR.

By Wm. H. G. Logan, Colonel, Medical Corps, N. A., U. S. A.

(President's Address, Read before the National Dental Association at Its Twenty-Second Annual Session, Chicago, Ill., August 5-9, 1918.)

BEFORE recording the status of the Dental Service in the American Military Force at the time our Commander-in-Chief, President Woodrow Wilson, declared before the joint session of Congress of the United States of America, on April 6, 1917, that a state of war now exists between this Nation and the German Imperial Government, I desire to convey my appreciation of the honor conferred and compliment granted in having had the opportunity to serve the National Dental Association as its President, during this historic year, and for this trust and responsibility I very humbly but most sincerely extend you my thanks.

On April 8, 1917, or two days after the state of war was declared to exist, the Chairman of the Medical Committee of the Advisory Committee of the Council of National Defense called the first meeting of the General Medical Board at Washington, D. C., and created the following committees:

Committee on State Activities and Examinations.

Committee on Legislation.

Committee on Hygiene and Sanitation.

Committee on Research.
Committee on Dentistry.
Committee on Medical Schools.
Committee on Publicity.
Committee on Hospitals.

The names of the members of the General Medical Board and the Sub-Committees on Dentistry appointed are herewith presented and marked "Exhibit A." For the creation of the Dental Committee of the General Medical Board of the Council of National Defense, I desire here and now to convey officially the National Dental Association's appreciation of the very courteous act thereby extended by the Chairman of the General Medical Board for granting this recognition for Dentistry.

PERMISSION GRANTED DENTAL STUDENTS OF CONSCRIPTION AGE TO COMPLETE THEIR PROFESSIONAL EDUCATION PREVIOUS TO BEING CALLED FOR MILITARY SERVICE.

On July 18, 1917, the deans of the Dental Schools were called to Washington to confer with the dental committee of the General Medical Board to discuss the enrollment of students in the Enlisted Reserve Corps of the Medical Department, and permit them to be assigned to the inactive status until the date of their graduation. It was then considered imperative, and is now so held by the writer, that young men of conscription age, should be permitted to enroll in the Enlisted Reserve Corps of the Medical Department, under the proper limitations, for the purpose of completing their dental education, before being called for general military service. At this conference, a sub-committee was appointed, with power to act, and altho an educational propaganda was officially carried forward by them all of those in close touch with the subject had reached the conclusion that they had been unable to convince those in authority of the justness of their claim.

During the summer and early autumn, many dental students were called by the local boards and sent to the various camps, until October 6, 1917, when, without the knowledge of any dean or the committee representing the National Dental Faculties Association, or the Legislative Committee of the National Dental Association, an amendment was attached in the Senate to the dental bill enacted on that date, which specified that "all regulations concerning the enlistment of medical students in the Enlisted Reserve Corps and their continuance in their college courses while subject to call to active service, shall apply similarly to dental students." I am of the opinion that if the dental profession, thru its committee, representing the Dental Faculties Association, had been successful in their efforts to secure for dental students the privilege given medical students to remain in their course of instruction until graduation, without legislation, that regulation would have been rescinded during the past few months. The reason for this is found in the apparent lack for the need of additional dentists to supply the present military force. But after a careful review of the number of dentists required for the present Army, and those who will be called to the colors before this war is carried to a successful issue, and added to this those demanded to administer to the civilian population, it can be positively proved there will not be sufficient dentists in the United States in three to five years from this date, to care for those requiring their services, in spite of the opportunity granted by our present law to permit dental students to complete their course of instruction before being called for military service.

In concluding this phase of my subject, the opinion is expressed if Congress had not granted the opportunity for dental students to enlist in the Medical Enlisted Reserve Corps and be placed on the inactive list until gradu-

ation, a serious reduction in the number of dentists required would have been one of the end results, and another would have been that the majority of dental institutions of this country would undoubtedly have closed their doors for instruction during the 1918-19 session, or soon thereafter, for they would only have the matriculants who were physically defective or not of conscription age, which would not warrant, in most cases, the continuation of our Dental Institutions during the present war. Furthermore, should hostilities be continued as long as the best informed believe, there would not be a sufficient number of dental officers who were physically fit to care for the needs of the Army should the quota permitted by law be increased in the ration we have reason to expect the demand will require during the next eighteen months.

SHOULD LEGISLATION BE SOUGHT AT THIS TIME TO INCREASE THE QUOTA OF DENTAL OFFICERS NOW PERMITTED BY LAW FOR ASSIGNMENT IN THE REGULAR ARMY.

In discussing the question of the probability of an increase in the quota of dentists for the Army, there are many among you who have radically differed with me as to the propriety of seeking of Congress during the past year a law calling for at least one Dental Officer for each five hundred men, instead of one per thousand as now allowed for the Regular Army; while others contended a law should be secured to assign three to each thousand, and desire to reply to such variance of opinion and criticism as follows: Since there are but few who have given serious thought to the military needs of the hour, who do not consider wisely the advisability of making definite plans for an Army of at least ten million, therefore to those of you who are insistent that Legislation be secured requiring the assignment of two or three dental officers per thousand, I ask, from what course will you procure the twenty or thirty thousand dentists for the Army of ten million, should it be required? My answer is, there is not the maximum number of dentists practicing in the United States between twenty-one and fifty-five years of age, who are physically qualified for general military service.

Furthermore, what evidence have you to present as to the average dental requirements of a division, and what data can you supply as to the number of dental operations there will remain uncompleted after a division has been in camp for a period of six months, for men accepted for general military service who have twelve serviceable natural teeth, all of which must be so opposed as to serve the purpose of incision and mastication? If any among you can supply this information, I am sure the Surgeon General's office would be pleased to receive it, for the reason the Dental Division of that Department has from the inception of this War, been increasing the efficiency of its dental records, with the idea in mind that they should be able to know the number of men in each division who need dental treatment and the amount required for each individual, also the number of cases completed each month, and the character and total dental operations to be required, before every man in the division shall be made dentally fit, with the end result that when a division or any unit proceeds to overseas service, we shall know exactly what has been, as well as what has not been accomplished.

With such evidence before us, I believe any warranted increase in the quota required in the assignment of dental officers in the Army can be secured, providing we can present documentary evidence the work has been carried forward under proper conditions, and that the type of dentistry accomplished has been efficient. The question might na-

urally arise, Why has this not been accomplished before, since we have had many divisions in our camps six months? My answer is that favorable conditions did not exist which made for rapid effective dental service of the type that should be used for the basis of such an argument, until all the permanent cantonments of this country had dental unit buildings where the officers could be brought together to work in groups of ten to fifteen under a supervising officer, and until dental inspectors could proceed to the various camps and systematize the work in the manner that it has been efficiently carried forward during the past few months.

In view of these facts, I assure you I will agree with any group of men that a sufficient number of dental officers should be assigned per thousand to complete in a six-month period certain types of dental operations needed, under the favorable conditions that now exist.

I have brought this question of the increase permitted for dental officers in the Army rather fully before you for we have not only had fair and honest difference of opinion raised on this question, but there has been unjust criticism in part advanced from sources that have been concerned, I believe as much by money benefits that would accrue to them as by their sympathy and understanding of the dental needs of our boys in the American Army.

Educational Activities.

In May and June, 1917, a majority of the Dental Schools of this country instituted gratuitous courses of special instruction for applicants desiring to enroll in the Dental Reserve Corps. The course was approved by the Surgeon General, and was of such a nature as to fit those in attendance to be better officers for hospital and field service. The instruction embraced the relationship of the dental officers to the supply and administrative departments of the Army and military law. A number of the institutions have repeated these courses at various intervals.

It is a conservative estimate to state that between four and five thousand dentists attended these courses of instruction without expense to themselves or to the Government, and the dental educational institutions of this country have a right to feel proud of this contribution.

On October 15, 1917, by authority of the Surgeon General, and under the direction of the Sub-Section of Plastic and Oral Surgery of the Surgical Head Unit, courses of instruction in plastic and oral surgery were instituted at Washington University Dental School, at St. Louis, Missouri, Northwestern University Dental School, Chicago, Illinois, and Thomas W. Evans Museum and Dental Institute, School of Dentistry, University of Pennsylvania, where medical and dental officers were detailed for instruction. The medical officers were given special instruction in plastic surgery, blood transfusion and bone transplantation, and the dental officers, in bone fragment fixation by intro-oral splints, the systemic effects of focal infections, and surgical anatomy of the face, jaws and neck. The courses were discontinued in March, 1918.

On March 15, 1918, a school for Army Dental Officers was instituted at Camp Greenleaf, Chickamauga Park, Fort Oglethorpe, Georgia, in connection with the Medical Officers Training Camp, for military and professional instruction of dental officers and their authorized dental assistants.

The duration of the general course of instruction for the dental officers is two months. The first month is given over to 180 hours of general military training and the second to 70 hours of special military training, and 110 hours devoted to professional subjects that have a definite relation to the general dental practice as it should be conducted in the

Army. Each class consists of from eighty to one hundred, and a small percentage is retained for training to qualify them for assignment as division dental surgeons or assistants to the Division Dental Surgeon. In the immediate future, a few from each class will be given special instruction in Roentgenology, as we have need for two dental Roentgenologists for each cantonment in this country, as authorization has recently been received for the installation of complete radiographic equipment in the dental unit building in each camp.

In this Officers' Training Camp, we have dentists receiving training that is of such a nature as will greatly increase their physical and professional efficiency. Furthermore, insofar as I know, this is the only country giving such extensive special training in military and professional subjects to dental officers and their authorized assistants.

Surgery of the Head.

On June 15, 1917, the Surgeon General approved of the organization of the section of the surgery of the head, which had among other duties the securing of a personnel especially qualified to care for diseases and injuries of the brain, eye, ear, nose and throat, face and jaws, and place in charge a member of the Medical Corps, Regular Army. The commissioned personnel of the Surgical Head Unit to consist of one specialist each for the brain, eye, ear, nose and throat, one plastic or oral surgeon, and one dental oral surgeon, competent to care for fractures, impactions, and pathologic diseases to which the teeth and jaws are subject.

It is believed by including dentists in the organization of the Surgical Head Unit, better service will be given to our wounded soldiers who sustained injuries of the face and jaws than could have possibly resulted had these cases been handled without the assistance of those specially trained dental officers, and in addition, a splendid opportunity is given to members of this profession to increase their ability and knowledge in surgical principles involved in the management of these surgical lesions.

Dental Legislation.

On October 6, 1917, a dental law was enacted by the Senate and House of Representatives, in Congress assembled, and approved by the president, which gave to the Dental Corps of the Regular Army the same grades and percentages within the grades then allowed or that might thereafter be allowed by law for the Medical Corps of the Regular Army. This bill was referred by the Surgeon General to the Adjutant General of the Army for interpretation, and the decision was reached that under the present strength of the Army, the Dental Corps was authorized to have nine Colonels, seventeen Lieutenant Colonels, and sixty-seven Majors, the remainder of the authorized strength of the corps to be distributed in the grades of Captain and First Lieutenant.

Dental Legislation giving advanced grades to the Dental Corps of the regular organization of the Navy was passed and approved by the President on June 30, 1918. The legality of this bill has not been passed upon by the Navy authorities. It is believed it will give increasing rank for Lieutenant, Junior Grade, to Lieutenant Commander, with pay and allowance of Commander and Captain, which expressed in Army terms increases the rank for dental officers in the Navy from the grade of First Lieutenant to that of Major, with the pay and allowance of Lieutenant Colonel and Colonel. The main reason why it was only possible to secure the advanced pay and allowance of Lieutenant Colonel and Colonel, without the rank at this time, was because the senior dental officers of the Navy have only been in the service about five years, whereas in the case of the Dental Corps of the Army,

when the recent legislation was secured for them, the senior officers had seventeen years of service.

Free Dental Service.

On August 19, 1917, with the approval of the Surgeon General, permission was sought from the Provost Marshal General to secure franking privileges for the Preparedness League of American Dentists, and concurrence in a plan which would make it possible for all men who had been accepted for general military service to be advised to appear before the members of that organization to have any urgently needed dental operations performed, without expense to themselves or to the Government, previous to their arrival at camp. This work was considered imperative at that time, for the reason there was only being assigned one dentist per thousand of the total strength of the Army, and also the manufacturers were unable to meet the excessive demands made upon them in the early days of the war.

The Provost Marshal General heartily approved of the proposal made, and gave every assistance possible, even urging by personal letter the Governor of each State to inform all local and Medical Advisory Boards that he approved of their appointing a dentist for volunteer service on each board to aid in the physical examinations of all men called before them, and expressed it as his opinion that the patriotic service offered by the dental profession would be of great value not only for the comfort, but to the efficiency of the National Army.

Following the Department's approval, a Dental Reserve Corps officer was assigned to the Preparedness League Headquarters, in New York, who, in cooperation with the officers of that organization, has obtained splendid results. The membership of this organization has increased in the past year from about 4,000 to 16,000, and as a concrete example of what the officers and members have contributed in the form of gratuitous service for men who have been accepted for general military service, it is here recorded that they have furnished the material and performed 375,000 gratuitous operations for men selected for general military service. It should also be stated that thru their activity, three dental motor car ambulances have been presented to the Government, and another one is to be tendered in the immediate future.

In reference to the dental profession continuing to render free dental service to the selective service men, the opinion is here expressed, with the approval of the Surgeon General's office, that since there are now especially constructed dental unit buildings in all of the camps, and that full dental equipment is available, as a result of the earnest and efficient co-operation on the part of the Dental manufacturers, the Department does not feel that the same imperative need now exists that pertained last Autumn for the continuation of all the various types of dental operations that have been performed in the past by the members of the Preparedness League, for the reason that the Army Dental Service has reached the point where it can now cope with the dental problem after the selective man arrives at his camp. However, the Surgeon General's office would be pleased if the members of the profession, thru the Preparedness League, would continue their volunteer service on the Local and Medical Advisory Boards, and, thereby prevent the acceptance for general military service of men who are not dentally fit. The hope is expressed by decreasing the number of filling operations, there will be a corresponding increase in the number of registrants made dentally fit gratuitously, who have been physically rejected wholly because of dental deficiencies.

In addition, their services are urgently sought under the plan already adopted by this splendid organization, to have all hopelessly diseased roots and teeth removed from the mouths of those men who have been accepted for general military service previous to their arrival at camp, for if this can be accomplished, a valuable service will be rendered, and the health of the soldier will be improved, as there is great danger in the early days of military training of the development of those systemic diseases which have their origin from these focal infections.

All officers and members of the Preparedness League will be pleased to learn that the Surgeon General's office, the Provost Marshall General's office and the Medical Officers forming the local and medical advisory boards, greatly appreciate the splendid and patriotic service they have been able to render men selected for general military service.

ENROLLMENT OF DENTAL OFFICERS.

The records show when this Government entered the present war, the American Army had eighty-six dental officers, eighteen of whom were captains and the remainder first lieutenants, and altho our dental law permitted Dental officers to advance to the grade of Major, this was only possible after said officer had a record of twenty-four years of service and limited the number to eight, regardless of how many there might be who had served the required twenty-four years. Of the eighty-six then on duty, only fifty-five were stationed in the United States, and these were widely scattered.

Altho a law existed at this time which permitted the organization of a Dental Reserve Corps, no rules or regulations had been promulgated to organize such a corps, until after we entered the present war, and altho many dentists were eager to enter the Dental Reserve Corps, the early plan pursued made it necessary for an applicant to forward his request to the Surgeon General's Office, the formal application was then furnished with and advised when the next board was to meet in his own state or an adjacent one, with the result that many days or weeks would elapse from the time the applicant would first apply until his completed papers would arrive for final decision. To prevent, if possible, this delay, the Chairman of the Committee on Enrollment and Legislation of the Dental Committee of the General Medical Board presented to the Surgeon General, on June 1, 1917, the plan whereby he was to be permitted to select representative men of the Dental Profession who, by education and experience, were well qualified to give professional examination to any applicant who desired to be commissioned in the Dental Reserve Corps. This request, altho most unusual, was immediately accepted and authority granted. Twenty-four hours thereafter preliminary dental examiners were appointed in every state in the Union. The Journal of the National Dental Association was held on the press for the purpose of including the names and addresses of these preliminary dental examiners in the June issue, and when The Journal went forward five days later, it carried fifty thousand of the first official forms for application to the Dental Reserve Corps. Permission was granted by the Surgeon General's office for the publication and forwarding of these application blanks with our Journal, because all Government printing presses at Washington were occupied for weeks in advance with so many important official documents that these forms could not have been secured as promptly by any other plan.

The men appointed as preliminary dental examiners were the deans of the well-recognized dental institutions, the

Secretary of each of the State Dental Examining Boards, and such dentists in addition as the service demanded. The names of these examiners are here presented for the record and marked "Exhibit B."

The End results of the appointment by the Surgeon General of the preliminary dental examiners is found in the fact that altho on the day of its authorization, June 1, 1917, or relatively two months after the beginning of war, there were only five officers in the Dental Reserve Corps, yet we find on September 18, 1917, or three and one-half months thereafter, all examinations for general practitioners were discontinued, as the War Department had a sufficient number of commissioned dental officers and completed applications on file for the present and immediate future needs of the Army.

In the sixteen months that have elapsed since the declaration of war, the number of dental officers has increased from fifty-two (52) to four hundred and forty-eight (448), in the Navy, while the increase in the Army has been from eighty-six (86) in the Dental Corps, Regular Army to 211; National Guard, from nothing to 259; Dental Reserve Corps, from nothing to 5504, making a total of 5974, or a sufficient number to supply the quota now being assigned for an Army of five million, which gives to this nation a greater number of dental officers, subject to military call, than all nations combined represented by the term "The Allies."

The following two facts are considered worthy of being recorded: First, the commission of First Lieutenancy was tendered nearly six thousand Dentists, and all but one hundred and thirty-nine of these have accepted.

Second: Altho the Dental Reserve Corps of the Army authorized for its present strength to have 2118 Captains and 1265 Majors, there have only been 250 promoted to the grade of Captain and 65 to the grade of Major. This can be accounted for by the splendid plan that has been followed in regard to the question of promotion, for here we find that every dentist coming into the service must accept the grade of First Lieutenant, and he cannot be advanced until after being placed on active duty, and then only does he become eligible when he has been recommended by his superior officers thru military channels.

Because of the splendid record of dental efficiency here shown, I request that I be permitted in closing this report to affirm that I have learned by daily contact that not all patriotic citizens have donned the Olive drab, for during the past year it has been my privilege to be associated with certain members of the dental and medical professions, constituting the Medical Board and the Dental Committee of the General Medical Board of the Council of National Defense, the Preliminary Dental Examiners of applicants for the Dental Reserve Colleges of the Nation, the National Dental Examiners Association, and officers and division directors of the Preparedness League of American Dentists, and altho a few of these men are in military service, the records of their efficient gratuitous acts shall form a brilliant part of the permanent records established during the present war emergency in the Surgeon General's office of the United States Army.

In the final statement of my address, I desire to record a truth that should be known to all Dental Officers and all Members of the Dental Profession of this nation that the real reason why dental service in the American Army has made such phenomenal strides during the last sixteen months is because there has been, at all times, not only an intelligent but eager desire on the part of Surgeon General Gorgas and General Robert E. Noble to secure for dentistry

every opportunity that was needed for this profession to live up to its possibilities to assist in doing its professional and patriotic duty in aiding to maintain the health of the American soldiers in this world's war, which must be fought to a victorious end that all people of all nations may live together in freedom.

EXHIBIT "A."

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A TRIBUTE TO THE LIFE WORK OF THE LATE GREENE VARDIMAN BLACK.

By A. W. Thornton, D. D. S., Montreal, Canada.

(Oration Delivered at the Dedication Black Memorial, National Dental Association Meeting, Chicago, August 5-9, 1918.)

IT WOULD be the variest hypocrisy for any man to pretend that he did not look upon such a privilege as is mine to-day, as a very great honor, and it would be an insult to your intelligence to expect you to believe that such an occasion is one of the ordinary events of any man's life.

I appreciate the honor and feel the responsibility more deeply perhaps than any of you can imagine.

Any ordinary man might perhaps have some knowledge of the application of colors to a canvas, might possess some ability in freehand drawing, might understand the underlying principles of perspective, but such knowledge or such ability would not justify a person in attempting to paint a landscape or a portrait to hang in an Art Gallery with the world's Masterpieces. And so, it appears to me, the occasion that brings us together at this moment, demands the effort of a "workman that needeth not to be ashamed" to worthily deal with the subject which has been assigned me. Let me say to you in absolute frankness and in perfect honesty, that I feel totally incapable of measuring up to what you have a right to expect. But when your President asked me to undertake this duty, there was but one thing to do,—accept.

And, if I fail, adequately to express the love which we all felt for the man to whose life and labors this memorial is dedicated, let your own full hearts at this moment, be the measure of that appreciation which my poor words must fall short of expressing.

As I tried during the past weeks, to think of the exercises in which we were to take part to-day, there came to my mind again and again, the words of King David, spoken three thousand years ago of Abner, "A Prince and a great man is fallen." The term, "A great man," is frequently heard, and yet, to what a comparatively few men can the words be fitly applied.

In Law, Moses stands preeminent, for the simple reason that the moral law, the Ten Commandments, stands to-day as it stood three thousand, five hundred years ago, the very foundation principle of national as well as of individual greatness.

In Sociology, the world has seen but one perfect example—The Man of Nazareth. In a few sentences, He laid on bed rock, the basic principles of Ethical relationships between man and man, and between nation and nation and the violation of these principles by a powerful European nation, is the cause of the terrific struggle now convulsing the world. Let me quote just a sentence or two, embodying some of His foundation principles:

"Whatsoever ye would that men should do to you, do ye even so unto them likewise." "I came not to be ministered unto, but to minister." "Let him that would come after Me, deny himself." "He that loseth his life shall find it, shall keep it unto eternal life."

Read to-day, the biography of the world's great men and you will find a striking similarity in life and thought and purpose in all of them. What man or woman can possibly attain to greatness and persistently violate any one of the Ten Commandments? Would you call any man great who would attempt to deal with his fellowman as he would not wish a fellowman to deal with him? Could a man, by any stretch of imagination, be called great, who was always receiving the ministrations of others in selfish enjoyment? What man to-day has the greatest chance of being classed with the world's great men? Is it not the man who has learned most perfectly the lesson of self-denial?

In the world's great cataclysm at the present time, who are the men whose names and whose memories are being enshrined in the hearts of all right thinking persons? Are they not the men who are losing their lives in order that national and individual lives may find a chance to express themselves along God-given lines? And was it not along the lines that I have just indicated that the life of the man whose memory we have met to honor, found expression?

Think of the work accomplished in a single lifetime. It was fundamental in character, it was stupendous in volume. When his own operations, as well as the operations of other men failed, he sought the reason of the failure and the means by which failure might be avoided, and he gave to the profession, scientific methods of operations which shall bless humanity while time lasts.

There is a question that must be ringing in the mind of every man here present. It is this: Why is it that men such as Dr. Black, are able to accomplish so much while most of us do so little? Is the difference between such men and the rest of us simply one of mental endowment? Are these men mental giants and the rest of us mental pigmies? No—I think not. What then is the reason? Is this the explanation? Only a few men in each generation are capable of sustained effort, and this perhaps is the secret of all true greatness. Longfellow has expressed that thought in these words:

> "We have not wings, we cannot soar,
> But we have feet to scale and climb
> By slow degrees, by more and more
> The cloudy summits of our time."
>
> "The mighty pyramids of stone
> That wedge-like cleave the desert airs,
> When nearer seen and better known,
> Are but gigantic flights of stairs."

And is this not the secret of the unparalleled success of him whose memory and whose life work we delight to honor.

Do you know that it takes fifteen pages of ordinary magazine size, in very small type, simply to give the titles of Dr. Black's contributions to the profession, of which he was the most distinguished member? The desire to attain to his own full stature must have taken possession of him even in early life.

Some years ago, I attended with Dr. Black and a number of other men from Chicago, the fiftieth anniversary of the St. Louis Dental Association. At that meeting, Dr. Black showed some lantern slides of sections of teeth that he had made years before, by hand, with a pen and India ink, before such slides were made by photography and they were as accurate and almost as delicate as those made by the scientific apparatus now available.

But the books which he wrote, the contributions which he made to so wide a field in science, the teaching he did in a great University, these are not the things that call out to-day, this voluntary expression of gratitude and esteem. We admire the ability which enabled him to overcome where smaller men must have met with failure. We acknowledge the debt we owe, because we are able to accomplish things which would have been altogether impossible had he not blazed the pathway to success.

We feel keenly, our own lack of attainment, when we think of him "in labors more abundant" but, we loved him—not for what he did, but for what he was.

Many of the men taking part in this exercise to-day, have a mental picture of him as they knew him best. Some will think of him as they met him at professional gatherings and the outstretched hand, the genial smile, the kindly word, seem to forge again the link that was broken, and they wonder if it can be indeed true that the "silken cord has been loosed." Others, especially the members of faculties from other schools, will have a vision of him in his own school, as the hearty, unassuming welcome was extended. Others, perhaps by far the largest number, will think of him as he walked thru the Infirmary, dropping a hand on a shoulder here, offering a word of advice there, giving a little help with an operation some other place, and as he did so, many a difficult operation became easier, many a problem was more readily solved, many a downhearted student felt that a veritable benediction had come "By the laying on of hands."

But why, may I ask, are we to-day dedicating and unveiling a memorial to Dr. Black? Why in all ages and in every country, have monuments been raised to great and good men?

"Can storied urn or animated bust
Back to it's mansion call the fleeting breath?
Can honour's voice provoke the silent dust?
Or Flattery soothe the dull cold ear of death?

We all know that this can mean nothing to him who so short a time ago joined the great company of those whom "We have loved long since and lost a while." Why then, do we do these things?

Two reasons, perhaps, actuate us: The first, to show to the world and to his immediate dear ones, that we loved the man and appreciate the life work fraught with such momentous importance to all future generations and in the second place, to inspire others to lead lives devoted as his was to the amelioration of suffering and to the extension of scientific education and individual culture, the only foundation upon which it is possible to rear the superstructure of national and individual greatness, happiness and prosperity.

More than three thousand years ago, that greatest of all questions was asked, "If a man die, shall he live again?" It has never been answered as we would

answer or prove a proposition in Euclid so that we might write after the answer, "Which was required to be demonstrated."

But strange, indeed, would be our conception of creation or evolution, whichever you wish, if having ears, there were no song of birds, nor laughter of children, no strains of sweet music nor articulate sounds of loving voices. It would be strange would it not, if having eyes to see, there were no rosy morns nor glowing sunsets, no green valleys nor snow-capped mountains, no mountain torrent flashing it's myriad of crystals in the sun nor placid lake reflecting back the softened rays of the harvest moon, no "sky and flowers and trees."

So I believe, that in some way the greatest yearning of the human soul, it's capability for love and service and companionship will be satisfied "When the golden bowl is broken, when the pitcher is broken at the fountain, when the wheel is broken at the cistern and the Spirit returns to God who gave it."

To have known a man like Dr. Black, to have enjoyed his friendship, to have felt the warmth of his social natures, to have feasted mentally so often and so bounteously on the satisfying mental pabulum of his production, is to intensify and make more real, the belief that "When the earthly house of this tabernacle is dissolved, we have a building of God, an house not made with hands, eternal in the heavens."

In the Genesis account of creation, it is said that God created man in His own image and likeness. It is in the lives of such men as Greene Vardiman Black, that the eternal, the infinite, the loving nature of God, is most clearly discernable. In the early ages, the passing of such men was spoken of in some such words as these: "Having served his day and generation, he has fallen on sleep."

Could words be truer of any man than of Dr. Black? Having served his day and generation, full of years and of honor, loved most by those who knew him best, "He has fallen on sleep." May "a double portion of his spirit" fill all our hearts.

Perhaps Dr. Black's Philosophy of life, life here, life hereafter, might be summed up in the following words:

"For me to have made one Soul,
The better for my birth:
To have added but one flower
To the garden of the earth.

"To have struck one blow for truth,
In the daily fight with lies:
To have done one deed of right
In the face of calumnies.

"To have sown in the souls of men
One thought that will not die,
To have been a link in the chain of life
T'will be Immortality."

THE TREATMENT OF ROOT CANALS BY A SILVER REDUCTION METHOD.

By Percy R. Howe, A. B., D. D. S., Assistant Professor of Dental Research Harvard University; Chief of Research Laboratory Forsyth Dental Infirmary for Children.

(Read before the Michigan State Dental Society, Detroit, 1918.)

THE need for root canal treatment is the outcome of caries. For this reason I shall speak first of the bacteriology of caries, its character, and its penetration into the tooth substance. In addition I shall refer to the efficacy of our present methods of treating the caries action. The classic work of Miller is familiar to all. His work was done when the subject of fermentation, particularly of wines and liquors, occupied the attention of many laboratory students. Miller applied this idea to dental caries and he showed by zinc crystallization that lactic acid was formed by the fermentation of bread with saliva. He regarded caries as due to a mixed infection. Goadby worked and studied it from a more modern standpoint. From deep caries he isolated two micro-organisms B. necro-dentalis and streptococcus.

At the Forsyth Dental Infirmary for Children, I undertook a study of the subject which comprised a larger number of cases than were ever studied. I chose the twelfth and sixth years molars. Here the carious process is most active. Modern bacteriological methods were used. A full account of the work has been published elsewhere.* We succeeded in isolating from all caries some members of Moro-Tissier group of microorganisms. This highly aciduric flora at least possesses the property of inaugurating decay and in a higher degree than other micro-organisms. I believe that Goadby's necro-dentalis belongs to this group. I cannot give an adequate description of these microorganisms here, but will show a few slides of them. This group is, as I have said, highly aciduric. Some members of the group are highly pleomorphic. It is a known group and has been studied by others in the feces of the nursling, constituting its normal intestinal flora.

Bacillus X (Figures 1, 2 and 3) is somewhat pleomorphic. It is Gram-positive on agar. It most frequently appears as a long chain of short, thick rods, 5×0.5 microns, the chains often showing parallelism. Under certain conditions the individuals are considerably longer and do not occur in chains. Moreover, smears of the organism often show only masses of long, tangled, unbroken threads, occasionally having one long thickened end. On glucose-agar many of the individuals fail to retain the Gram stain. It is an anaerobe facultatively aerobic. It produces a high degree of acidity, often requiring 14 cc. of N/NaOH to neutralize 100 cc. of the bouillon. It ferments glucose, saccharose, and levulose, but does not ferment lactose readily. It coagulates

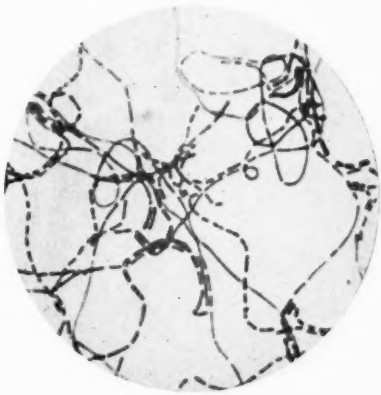
*Jour. Med. Research, July, 1917.
Dental Cosmos.
The Journal of The National Dental Association.

milk and does not form indol or ammonia. On Petri dishes its colonies are transparent, round, entire, slightly raised.

Figure 1.

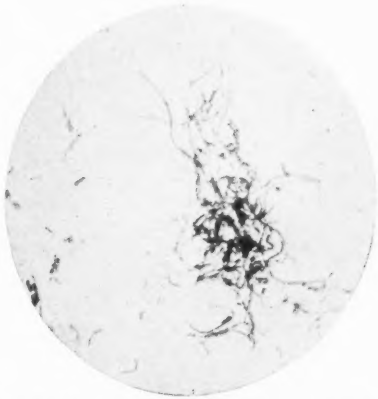
Bac. X: Agar, 48 hrs., Gram st., × 2000.
(Note variation in length of bacilli, also heavy thread forms.)

Figure 2.



Bac. X: Glucose-agar, 48 hrs., Gram st., × 2000.
(Note tangle of threads and chains.)

Figure 3.



Bac. X: Glucose-agar, 48 hrs., Gram st., × 840.
C'f with Goadby's B. plexiformis.

Bacillus acidophilus of Moro (Figures 4, 5, and 6) as found in dental caries is a non-mottle, non-pathogenic rod. When grown on agar it is short and thick and measures 0.75 × 2 to 3 microns. It is Gram-positive. On glucose-agar the rods are longer and thinner and more distinctively arranged in groups with the individuals showing parallelism. They produce turbidity of the media. They are Gram-negative. On blood serum the rods measure 0.1 × 1 micron. They are Gram-negative, grouped as in glucose-agar.

Bacillus acidophilus grows best anaerobically when first isolated by means of acid broth. In milk it clots the lower portion first. In peptone water it produces no indol or ammonia. In broth it forms a heavy sediment with some turbidity. It forms no gas in sugar. It is a facultative anaerobe and should be transplanted every ten days. It is a high acid former.

According to these studies it is not as pleomorphic as has been supposed.

The colonies are slightly raised, round, smooth, opaque and white.

B. bifidus, as it appears in the carious tooth, is to be found in many forms. It is found frequently in its bifurcating state (Figures 7 and 12) with tapering or with thickened ends, in V and Y forms, in streptococcal forms (Figure 9), as masses of Gram-negative cocci, (Figure 8), as straight rods (Figure 11), in crosses (Figure 11), and as a spore-former (Figure 10). It is Gram-

Figure 4.

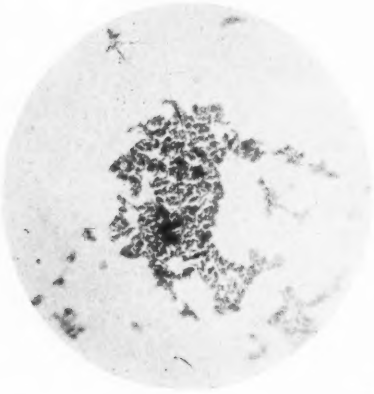


Figure 5.

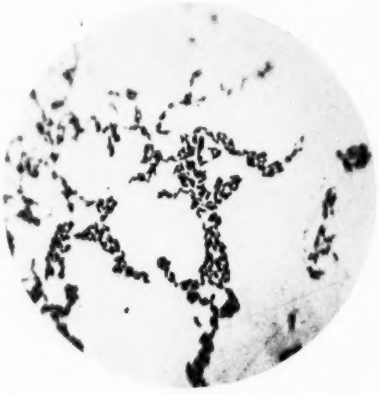
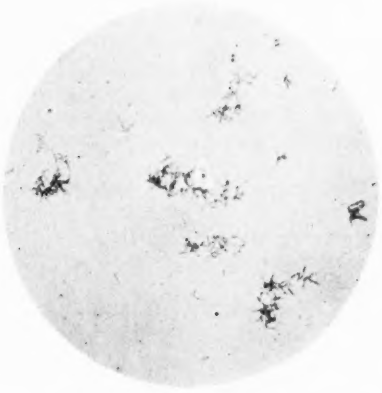


Figure 6.

Figures 4-6. Bac. acidophilus: Figure 4, Glucose-agar, 48 hrs., Gram st., × 840. Figure 5, Agar, 18 hrs., Gram st × 840. Figure 6, Glucose-agar, Gram st., × 2000.

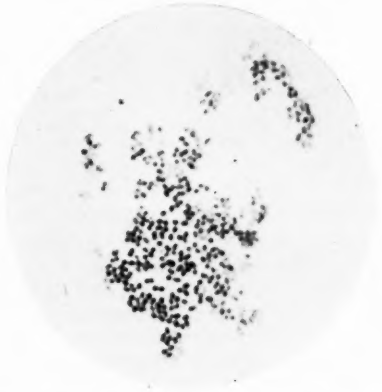
positive in young cultures. It grows aerobically and anaerobically, altho according to Kendall it is a strict anaerobe.

Figure 7.



Bac. bifidus: Glucose-agar, 72 hrs., Gram st., × 840.

Figure 8.

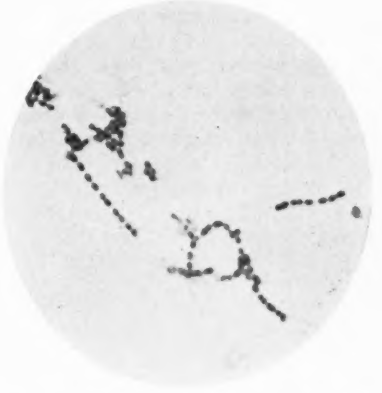


Bac. bifidus: Agar, 2 days, Gram st., × 1250. (Staphylococcal form.)

Noguchi shows it to have both anaerobic and aerobic phases. In contradistinction to his, the bifurcating form of our organism grows well aerobically after adaptation to artificial media. The colony is raised, white, entire, butyrous.

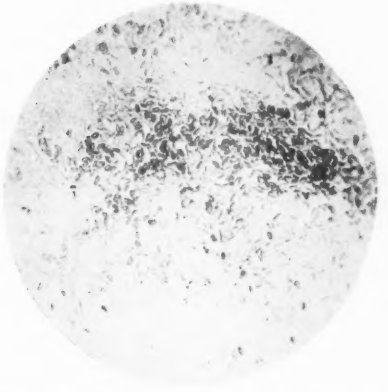
This brief description of the micro-organisms is made of excerpts from articles descriptive of this work.

Figure 9.



Bac. bifidus: Glucose-agar, 18 days, Gram st., × 1250. (Streptococcal form.)

Figure 10.



Bac. bifidus: Glucose-agar, 5 days, Gram st., × 840. (Rods and spores.)

In preparing many ground tooth sections in this study of caries, I was struck with the depth of penetration of caries.

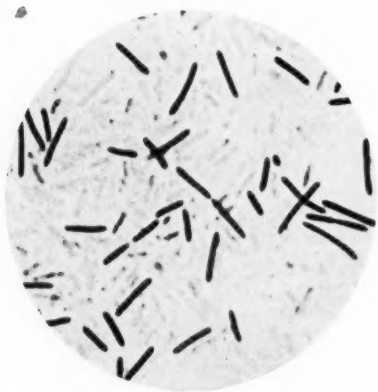
A flatly ground slide does not always show this but in many apparently superficial carious spots it is evident that the decay extends nearly if not quite to the pulp.

A bacterial examination of many nicely prepared cavities shows that they are not sterile. This fact together with the foregoing statement shows that it is not practical to attempt to sterilize a cavity with a bur. If we are to proceed upon surgical principles then we must sterilize our cavities. If we wish to do as much as we can to avoid pulp complication and still to proceed upon surgical in contradistinction to mechanical ideas, then we should excavate as little as possible consistent with retention, and sterilize our cavities.

*The method that I am about to describe to you will affect this sterilization; it will do more; it will impregnate all affected dental structure with finely divided metallic silver; it will not enter sound dentin. It is intended as a preventive measure. It will absolutely kill the carious process and it protects against a secondary attack. I believe that it should be applied to children's teeth as a routine matter. It will enter any defect in structure, destroy the bacterial flora, and block the tubuli with finely divided silver. It will not enter, nor stain sound structure.

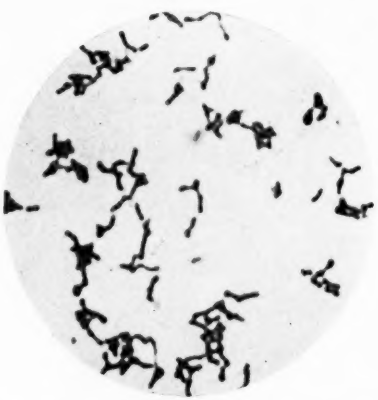
In a simple cavity make a good edge; clean out the loose debris, and wash out with alcohol to get rid of fatty substances; then apply this material. This will fill the disorganized dentin in an infinitely more perfect manner than is otherwise possible. Fill the bulk of the cavity with anything you desire. You have avoided to the fullest possible extent encroachment toward the pulp. What I want to especially emphasize at this point is the value of this method as a preventive measure. If children's teeth were treated with this material thoroly beginning with the very young, and if it were periodically followed up, I believe caries would be entirely forstalled or obliterated. The mechanical using up of tooth structure is largely done away with. Before I go on to describe the principles to be observed in the treatment of any root canal work, and before I describe the technic of applications in

Figure 11.



Bac. bifidus: Glucose-agar, 11 days, Gram st., × 2000.

Figure 12.



Bac. bifidus: Blood serum, 2 days, Gram st., × 2000.

*Dental Cosmos, Sept., 1917.

various other dental conditions, let me tell you how to prepare the material and something of the chemical action.

Prepare two solutions as follows:

Solution A.: Three grams of silver nitrate crystals, dissolve in 1 c. c. of water. When dissolved cool a little and add 2.5 c. c. of 28% ammonia.

This will give a murky solution. It should have no odor of ammonia. Allow it to settle; the clear top solution should be used. Keep in a dark glass bottle; then prepare.

Solution B.: which consists of a twenty-five per cent solution of formalin, and keep this in a separate bottle.

If some of solution A is poured into a test-tube, or small glass vial and solution B is added, a heavy precipitate of metallic silver occurs, making a mirror upon the sides of the receptical. The chemical reaction that occurs is one of reduction. Many substances will reduce the silver from this solution, but we believe formalin to be the best for our purpose. I have written an account of this method which has appeared elsewhere, and because there is much to be said upon the technical side of the question I shall here confine myself to that part of the treatment.

We are dealing with a powerful antiseptic. There is no question as to its ability to produce sterility. This, we have demonstrated by many careful tests. Anyone who does not get sterility has not mastered the technic, or does not carry out his tests with the exactions demanded in such work. It is then to be remembered that any antiseptic will destroy living tissue before it will bacteria, and it is better to confine this solution to the tooth proper. If it goes thru a root-end it will cause pain, if the tissue about the root-end is intact. We may use it within the tooth substance and under certain circumstances we may use it outside the tooth-root. We must always hold in mind the distinction between dentin and cellular tissue. The proper antiseptics to use in the soft tissues are Dakin's solution, Eusol, Physiological Salt, or drainage. These solutions mentioned are somewhat antiseptic. They are solvent of mucin, pus and other detrius, and eusol has a different osmotic pressure than the blood causing an exudation of the serum, which is, of course, the best of antiseptics. These preparations then, clean the tissue and induce the destruction of bacteria in the natural way, promoting healing. They do not injure healthy tissues. There are a number of preparations on the market that are based on these principles, but for convenience I will give here the method of preparing these solutions. Dakin's solution is prepared as follows:

20 gms. lime chlorinated.

1 liter water.

Let this stand 6 to 12 hours, shaking from time to time.

Filter—Estimate the chlorine in solution as follows:

To 10 cc of filtrate add 20 cc of a 10% solution iodide of potassium and 2 cc of glacial acetic acid or strong HCL.

Titrate against N/10 sodium thiosulphate decolorization marks the end point.

Number of c. c. of thiosulphate of soda required X 1.775=per cent of chlorine in 100 gms. of the chlorinated lime used. Carry on work from Daufresne's table.

E. g. Thus if 14 c. c. of N/10 thiosulphate is required 14 X 1.775=24.85.

Twenty-five titer of cal. chlorid sample means chlorinated lime 184 gms. must be used for 10 liters.

Dry Soda Carb. 93 gms.

Bicarb. 72 gms.

Place chlorinated lime into one bottle and sodium carb. and bicarb. into another. Let stand 6 to 12 hours, shaking from time to time. Mix, let stand half hour and filter thru double paper—test for strength. N/10 sodium thiosulphate consists of 25 gms. to liter.

Eusol is prepared by adding 25 grams of equal parts by weight of chlorinated

lime and Boric acid to a liter of water. Dichloramine-T paste is made as follows:

Stearic acid, 16 grms.

Water, 200 c. c.

Chlorazene, 4.6 grains.

Enough sodium hydroxide is added to completely saponify the acid. Dichloramine-T is an attempt to render Dakin's solutions more stable. We have used it in root canals with enlarged foramina with nothing but good results. never known one to ache when this was done.

Before I describe its application in root canal work, I want to show you some slides showing that whenever a pulp or the peridentium is inflamed for any length of time a structural change occurs in the tooth substance. The dentinal tubuli disappear and the structure becomes hyaline. Compare Figures 13 and 14 with Figures 15, 16 and 17. This hyaline condition com-

DAUFRESNE'S TABLE.

Titer	Chlorinated Lime.	Chlorinated Lime	Dry Carb. of Soda.	Bicarb. Soda.
20	230	Gms.	115 Gms.	96 Gms.
21	220	"	110 "	92 "
22	210	"	105 "	88 "
23	200	"	100 "	84 "
24	192	"	96 "	80 "
25	184	"	92 "	76 "
26	177	"	89 "	72 "
27	170	"	85 "	70 "
28	164	"	82 "	68 "
29	159	"	80 "	66 "
30	154	"	77 "	64 "
31	148	"	74 "	62 "
32	144	"	72 "	60 "
33	140	"	70 "	59 "
34	135	"	68 "	57 "
35	132	"	66 "	55 "
36	128	"	64 "	53 "
37	124	"	62 "	52 "

(Based on 10 liters and to contain .45—.5% Chlorine.)

Dichloramine-T has been used in bone infection.

Now in the treatment of deep caries we are approaching the pulp, and this is cellular tissue. This silver preparation would injure it, therefore, I recommend mixing a paste of zinc oxide and eugenol, adding to it a crystal or so of silver nitrate, and smearing this over the bottom of deep cavities. This will become quite hard. Follow by applying, first, a drop of solution A, followed with a drop of solution B; repeat about three times in order to reduce a considerable amount of silver. Dry the cavity and fill with any material you like. The cavity is sterile and the fine anatomy of the tooth is filled with finely divided silver.

An application of the zinc oxide-eugenol-silver-nitrate paste may be put directly over an exposed pulp. I have pleted is impervious to the most penetrating stains. It is sealed by nature. It occurs in chronic abscesses, and while, undoubtedly it is a degenerative condition, it is at the same time a protective one. A modified form of this is seen in the protection nature tries to establish before the inroads of caries. Previous to the completion of this process the tooth undergoes a disintegrating condition, where the tubuli stain deeply, and are also full of infection. This treatment kills the bacterial life and fills these tubuli with metallic silver. Figures 21, 22, 23, 24, 25. We have something besides the canal to consider then in root treatment, we have the tooth substance itself to treat.

An examination of the cuts shows what change has taken place and it also shows the penetration of the tooth substance by the silver.

In the case of a dead pulp, apply the material freely before entering the canal with the instruments. If the putrescent pulp is left intact the material will follow along its entire length, no matter how fine or how crooked the canal, and it will render the pulp stiff, dry, and sterile. The material will stop short at the point where the tissue is living. This pulp never need be removed, but I should remove it and treat again with the silver, being careful not to work it thru the end of the root. The treatment has rendered the canal sterile and impregnated the diseased dentinal structure with metallic silver. The bulk of the canal may be filled with anything. It does not matter. The anatomy and the apices of the tooth are already filled.

The sterilization of any pulp canal is affected in the same way. I depend largely on capillary attraction for con-

Figure 13.

Figure 14.

These are sound teeth from patients twenty-two and twenty-five years of age respectively. The dentinal structure is white, opaque, and uniform in appearance.

Figure 15

Figure 16

Figure 17

Show abscessed teeth. Figure 16 shows pyorrhetic tooth. Note in Figure 17 that both the pulp and the pericementum have taken part in this dentinal change.

ducting the material to its proper place. If you will take a laboratory tooth and open the pulp chamber and flood it, you will see that the silver comes out at used. Pain means that the material has been forced thru the apex, and it means nothing else. Place a broach into the canal, apply a drop of the silver solu-

Figure 18

Figure 19

Figure 20

Showing localized areas where the dentin has become completely hyaline, with no dentinal fibrils to be seen. These areas will not take stain. They are absolutely sealed.

Figure 21

Figure 22

These teeth were treated in the mouth and then extracted. The sides were ground off and the penetration of the silver is shown. The healthy tissue is not penetrated, but the unsound structure is.

apices of the root, no matter how fine the canal.

Reports have come to me of severe after-pain. This is due to faulty technic and to disregard of the principles upon which antiseptics are to be tion; let it run along the broach, lightly lift the broach and lower it. The material will go to the very end. Then apply in the same manner the formalin. The silver reduction immediately occurs. Repeat three times; then dry, apply

solution A, alone; follow with eugenol, dry and fill. This last application removes any possibility of formalin excess. Such men as are accustomed to handling formalin will have no trouble. Formalin is a most excellent root canal antiseptic, but there are men who do not understand its use and they have nothing but trouble. There should be no pain whatever. If there is it will subside and no harm is done, but it means that one should correct his technic. Keep away from the apical region with

With a blind abscess do the same thing.

I have a record here, at the Forsyth, of more than four hundred cases treated by six or eight operators and we have extracted only three teeth. We have treated every description of cases. Operators have to master the technic, however, or they have their troubles. The efficacy of the treatment remains even if it is impaired thru the lack of understanding of surgical and therapeutical principles.

Figure 23

Figure 24

Figure 25

These are laboratory teeth. The tooth in Figure 23 had five foramina. All foramina are filled. Note the healthy structure in the root of the tooth in Figure 25, just above the gum margin.

instruments. What the object is in forcing a foreign material thru a root end in any case is, I cannot see. Such a process disturbs the delicate adjustment of vessels and tissue that should properly cover the root-end and is unscientific. Nature is wonderfully tolerant and will encyst many foreign substances, but why ask it of her.

When we have a fistula, treat the tooth once with the silver solution; force Dakin's solution thru the fistula, once or twice, and if this does not cure it, repeat again. At the last treatment apply the silver treatment several times in succession and fill.

Formalin alone does not effect the sterility that this process does, neither does the silver nitrate alone. It is during the activity of the chemical action that this is attained.

For a nicely cleaned cavity, phenol five minutes, followed by seventy per cent alcohol is very effective as a sterilization process.

Eugenol and zinc oxide is quite antiseptic. Antiseptic cements have but little antiseptic value according to my experiments and they have been extensive.

All my studies have been conducted in the teeth in the head of the patient. Other experiments upon laboratory teeth

do not represent the true state of affairs, and are limited in value. From what I have shown regarding the hyaline areas that occur in chronic abscessed conditions, it is evident that nature attends to such a condition in a very perfect manner when the cause is removed. The so-called granuloma is an attempt on nature's part to repair and wall-off the effect of instrumentation or of the mild tooth infection. We must bear this in mind in X-ray interpretation. Many an established protective process has been condemned by wrong interpretations. I believe that when we remember that nature as a rule is perfectly competent to take care of minor infections, that all protection against bacterial invasion comes from within the body, and that all processes of repair likewise are done by the bodily tissue, we shall feel that we have little fear from the teeth from an infective point of view.

There is no question but that there has been a great deal of needless extraction on the theory that the teeth are a causative factor in disease. In certain cases they may be, but this I believe to be the exception. The teeth are necessary organs. They are instruments in the digestive act. No one knows much about these general diseases attributed to the teeth. All are agreed that infections in and about the teeth are low in virulency. By injecting these organisms even in enormous doses one cannot produce a blind abscess or pyorrhea. The infection is secondary in my opinion. Clean up such areas of course, but do not condemn the teeth for obscure conditions, the cause of which is unknown. We should bear in mind the principles of immunity, a topic of too great magnitude for me to discuss here. I believe that we know how to safely conserve teeth, and that we should clean, fill, and treat oral conditions according to surgical principles and only as a last resort fall back upon extraction.

THE EFFECT OF TIME AND WEAR ON THE HUMAN TEETH.

By A. E. Webster, M. D., D. D. S., L. D. S., Toronto, Canada.

(Read before the Buffalo Dental Association, February 12, 1918.)

Enamel—Color.

THE color of the enamel of the human teeth gradually darkens with years, but to a much less extent than is commonly supposed. It is the dentin which gives the general color to the teeth. The enamel, however, is subject to the influence of staining substances applied locally. In many parts of the world teeth are stained black or brown with vegetable stains. The betel nut is most commonly used for this purpose. Tobacco gives the enamel a distinct yellow hue. Enamel which readily becomes stained likely has some physical defect. Occasionally, enamel, which was perfect before a long serious illness, becomes mottled yellow and white. A few cases have been seen in which the whole surfaces of the teeth are chalk white or dead white like paper. Such enamel may readily take up stains and can be almost as readily destained. Old teeth, whose surfaces are much worn, stain more than those not worn.

Histologists have said that the enamel rods, as they approach the dentin, are more interlaced than at the surface but this would not seem to be the case, judging from practical experience, because enamels whose surfaces are worn away, split more readily than the reduced thickness would seem to indicate. It is the loss of the cementing substance of the enamel which makes the chief changes in the color and in the friability. If the cementing substance is lost the teeth are a dead white but may soon become stained from acids formed in the mouth or from vegetable stains. One often sees deciduous teeth much stained, especially if they have been considerably worn or too long retained.

Stained enamel may be destained by applications of hydrogen peroxide under heat as described by (Head), a pledget of cotton is saturated with peroxide of hydrogen and placed upon the surface of the enamel and a large hot instrument is placed upon it. This is repeated several times. Unfortunately destained teeth soon return to their former color because the enamel is defective or porous and the cause of the original staining is likely still present.

There is a type of pink tooth which occasionally occurs in one or more of the anterior teeth that must not be confounded with the pink tooth following the devitalization of a pulp, or the pink hue due to a staining of the enamel. The pink tooth mentioned seems to have the color in the dentin.

The wise dentist will base his treatment of discolored enamels upon the cause and the prognosis, knowing that as years go on pigmentations increase. There are green stains on the surface of the anterior teeth of young people and reddish pigmentations on the surface at the gingival, found in some localities which are not to be considered at this time.

Wear.

As years pass, the enamel becomes

gradually thinner and thinner, depending upon the amount of grit or friction applied to the surface. Among those races of people who use sand on wood fibre sticks to polish their teeth, the enamel is frequently worn completely thru. This also occurs among people who live in sandy desert places or among those who eat foods of a sandy character. Chewing tobacco will do it. As the enamel becomes thinner it becomes more friable, having checks or cracks almost the full length of the crown. These checks are often open wide enough to admit staining substances thus giving a yellow streaked appearance to the labial enamel. Dentists of experience have often been struck by the ease with which enamel will check when sharp instruments accidentally cut across its surface. Corners of incisors seem to split off without much apparent reason. Such enamel needs special attention in cavity preparation; namely, lap joint inlays. If the pulp is lost there is no doubt about the enamel becoming more and more friable as years pass. Such enamel is less strcng and should receive different treatment in cavity preparation from the enamel of vital teeth.

Besides the wear from abrasion there is the wear of attrition and erosion. Some enamels and dentines, especially of the deciduous teeth, wear until the half of the substance of the teeth is lost. A peculiar thing about some of this wear is the cupping of the occlusal surface. It would seem that as soon as the enamel is worn thru, the dentin hollows out, tho it does not come in contact with an antagonizing tooth. An erosion rather than an attrition or abrasion. These cuppings are often so deep that fruit seeds and other foods wedge into them splitting the surrounding enamel. Judicious grinding of the enamel, in such cases, will avoid large plates of enamel being split off. It is not at all uncommon to see the teeth of old people worn to the gum line, especially is this the case in the anterior part of the mouth, if the molars have been lost.

The effect of occlusal wear, if in marked degree, is to bring the upper and lower jaws closer together with the consequent change in the condyle path. With the closure of the jaws there is a protrusion of the lower. If the molars and bicuspids have been lost, an edge to edge bite is developed which usually brings about a rapid wear with less cupping. In some cases the upper anterior teeth are protruded and worn chiefly on the lingual aspects. Teeth which once antagonized normally will sometimes develop a gliding wear which will place them in false positions, while in other cases, the wear will be such as to lock the bite, giving the patient no possibility of lateral movement while the teeth are in apposition. Single teeth often begin to change position without any apparent perioclasia, such cases often have their origin in occlusal wear. Such mal-occlusions as are developed from occlusal wear might be classified as traumatic occlusions and undoubtedly have a baneful influence on the periodental membrane. Having recognized the condition and its prognosis if untreated, the dentists' duty is clear. Restore the teeth and occlusion to the normal for this patient, keeping in mind that which is normal for one patient is not normal for all others. Don't be afraid to use carbon paper and the stone but leave all ground surfaces highly polished.

It would seem that the more rapid the occlusal wear, the more likelihood of the surfaces being sensitive to attrition. If acid fruits are indulged in, such exposed dentines become exceedingly sensitive. In cases of eburnation, however, no such sensitiveness develops from the use of acid fruits or to thermal changes. Pathological pulps are undoubtedly developed under worn teeth as hyperaemic pulps, pulp stones, atrophic pulps and marked pulp reces-

sion are more likely to be met with than in unworn teeth. If for no other reason than to save the development of pathological pulps, exposed dentin should be protected from irritation. One's observation should have told us that tooth tissues are exceedingly porous, but it remained for Bunting to demonstrate it. In future exposed dentines will get more attention than in the past.

Erosions, which are commonly supposed to be found on the labial, buccal, and occasionally, the lingual surfaces are in the writer's opinion not at all different from the loss of tissue which occurs on the occlusal surface. There is undoubtedly a combination of solution and attrition or abrasion. The tooth tissue is softened by a weak acid and then the tooth brush or food readily wears away the surface. All the peculiar notchings of the labial and buccal surfaces can be readily reproduced by artificial brushings. Once the enamel is worn thru the dentin goes rapidly.

Dental toilet preparations, such as pastes and powders, depend upon a grit which they contain for their value. Some of these preparations contain so much grit that if used once or twice a day over a period of many years, the enamel will be worn thru and deep cuts made into the dentin. Those preparations which have a finely ground powder are not as efficient for cleaning the surfaces of the enamel and may be used much more frequently. It is essential that a dentist, in recommending any tooth preparation should also know how frequently it should be used.

Dr. W. E. Cummer rigged up a machine to brush human teeth while held in a plaster form. He figured out that the permanent teeth should be capable of being brushed twice a day for at least forty to fifty years without appreciable loss of structure. Giving each tooth two to three strokes a day would mean that it would get 45 to 50 thousand strokes in a lifetime. It was noted in these brushings that as soon as the enamel was worn thru, cutting became rapid or if the brush was allowed to reach the cementum rapid loss of structure occurred. The illustrations show that the peculiar forms of the cuttings made with the brush and paste or powder are identical with those commonly formed on the labial surfaces of teeth and classified as erosions. The illustrations also show the comparative cutting power of the grits used under similar circumstances.

In many cases of considerable occlusal wear in the molar and bicuspid region, contact is lost and the patient is unable to masticate satisfactorily, altho he may have a full complement of teeth.

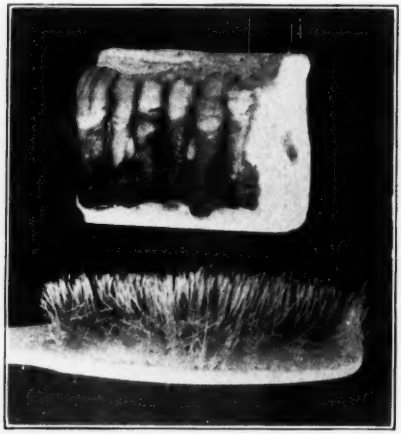
The writer has observed that teeth which wear away badly rarely have dental caries and what is more, such dentines cut easily as if they were less dense. If for some reason, solution ceases, then there developes a hard glistening surface as if brought about by burnishing. This surface is often as hard as some enamels. It is called ebornation or tubular calcification.

The linguo-occlusal surfaces of incisors wear away until the dentin is exposed, leaving the thin labial plate of enamel unsupported by dentin which readily splits off leaving a saw edge to the enamel or in some cases so much splits off as to leave distinct notches. Such wearing and notching is more rapid if the molar teeth have been lost.

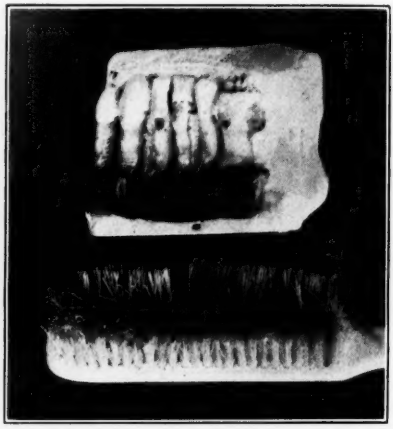
When teeth have been lost or there is a marked malocclusion there is often a gliding wear which cuts deeply into the tooth structure, causing the recession of the pulp or its death, as well as peridental irritation.

Dentists of experience and observation have recognized that natural tooth tissue wears away more rapidly than fillings, inlays, crowns, bridges or artificial teeth, but how many have applied this knowledge so as to prevent the failure of former dental operations. As the teeth wear down, fillings, inlays, crowns and bridges receive more and more of

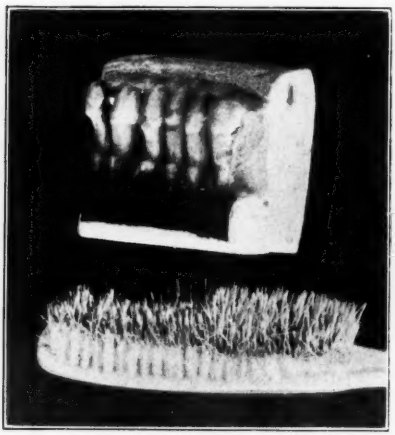
the weight of occlusion. All have recognized, with pride, the glistening burnished spot on the lingual surface of an anterior filling or inlay, showing the heavy occlusion delivered upon this surface. Proud of our former skill because the filling has not been dislodged tho it receives unusual stress. The consequence of such impact, is certain to dislodge the filling, and, perhaps, the corner of the tooth as well. If it should happen to be a crown, it is sure to bend the pin or split the root. Such points of weight of occlusion should be freed by grinding, from time to time, as necessity demands. This is a prophylactic measure. How we have watched that large pure gold inlay or amalgam filling



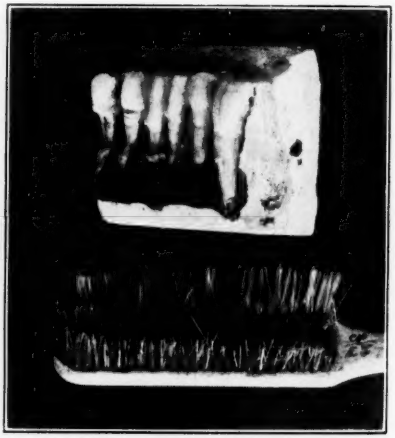
Castile Soap.



Euthymol.



Cuttle Fish Bone.

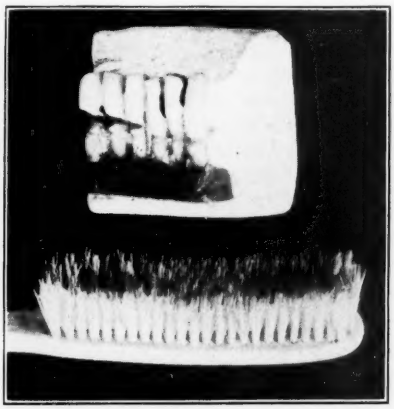


Char Coal.

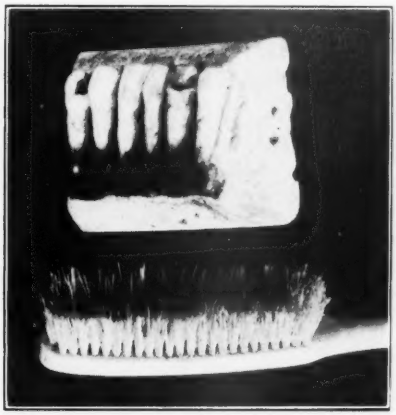
being beaten by an antagonizing molar tooth as if it were intended to make gold foil of it. Sooner or later such fillings will fail. An amalgam so beaten will flow, if the filling doesn't fail, the peridontal membrane will.

Another consequence of occlusal and proximal wear is the development of periclasia from wedging of food and traumatic occlusion. Since the introduction of the inlay process, there is no reason for not protecting against occlusal wear and proximal wear as well.

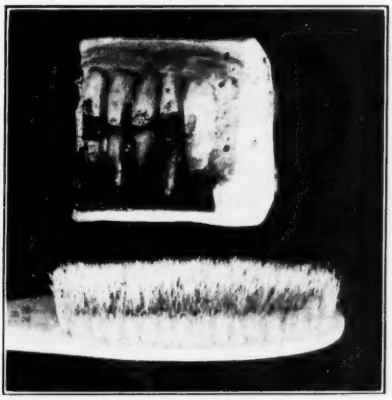
There is an approximate wear of the teeth which is little recognized and is always associated with marked occlusal wear. The individual movement of the teeth is sufficient to wear distinct facets on the proximal surfaces, thus leaving flat contacts where there were once convex contacts. This reduces the mesiodistal diameter of the teeth and permits



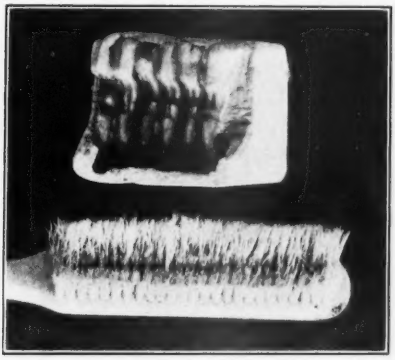
Sanitol.



Oris Root.



Oxites.



Pumice.

food to pass between them and makes the beginning of periclasia.

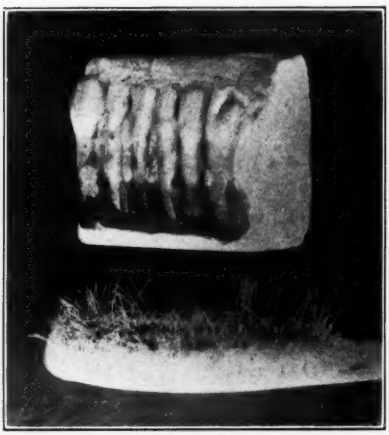
The wear of artificial appliances in the mouth will not be considered in this connection.

Time undoubtedly brings about a certain chemical change in both the enamel and the dentin as occurs in other structures of the body. This chemical change has its chief effect on the cementing substance of the enamel rods. There is a reduction of those vital elements which hold the rods together and an apparent increase of the calcium carbonate elements. Tho enamels may be more resistant to cutting instruments they split easier as years go on. So it is with dentin, there is an increase of the calcium salts under normal conditions and yet there would seem to be a distinct decrease in these elements under pathological influences. Every operator has recognized that tooth tissue gradually becomes less sensitive to cutting instruments as years go by, and that pathological dentin or the pulp of the old patient may be more sensitive than that of the young.

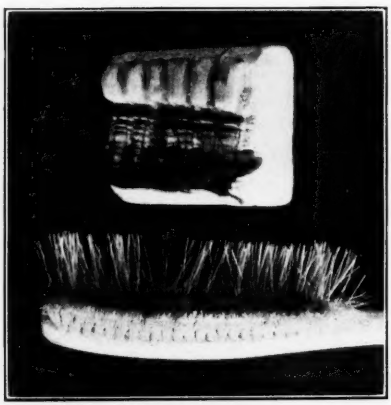
These chemical changes in the structure of the teeth must not be looked upon as being sufficient to make the tooth of the old person less liable to dental caries than the young. The cause is much more obscure than this.

Having directed our attention in a very cursory manner to what occurs in time and wear of human teeth, let us now think of the effects of those changes. How should the knowledge of these things influence our practice? It is all very well for us to examine a young patient's mouth and recognize several small gold fillings in the proximal surfaces of the anterior teeth, and also a slight linguo-occlusial wear, but how many of us really begin to figure out what this means for the patient twenty-five or forty years hence? It is one thing to discover what is now happening but unless we are fully aware of the remote consequence of the present conditions, we are not likely to apply appropriate prophylactic measures.

The time was when dentists were most anxious to find a remedy for the symptoms presented by their patients while today many are keenly exercised about the cause of the symptoms or the



Precipitated Chalk.



Pumice.

diagnosis. This is good as far as it goes, but let us now look into the future a little further and study the remote consequence of a wearing down molar or a decay at the gingival of a second molar, at sixteen years of age. How unconcerned we are when a child of ten or twelve presents with a beginning caries in the upper lateral incisor. Let me remind you older practitioners lest you have forgotten, and sound a warning to the younger men, of the dental history of such a lateral incisor. A cement filling for two years. A silicate for perhaps three more, or perhaps a small gold filling for the same time or perhaps five years more. Each succeeding filling getting larger and larger until the occlusion strikes heavily upon the lingual surface, as the teeth wear away. The filling receives the occlusion and is dislodged together with the corner of the tooth. Now a step cavity with either a gold filling or an inlay, this lasts well, until, perhaps, the molars and bicuspids are lost or the teeth wear away until occlusion again dislodges the filling or a few months neglect has caused the involvement of the pulp. The pulp is devitalized, the root is filled, another inlay or crown is placed. In a few years more the patient developes rheumatism, endocarditis, Chronic Brights or gastric ulcer. If the root is comfortable, it may not be suspected. An accidental heavy pressure splits it, when no further mechanical arts can do anything for it except extract it. The extraction relieves the patient of her chronic systemic disease. A marvelous cure made by Dr. Brown or somebody's pink pills for pale people. The patient blames the dentist for splitting the root when the crown was being set, and the dentist blames the patient for cracking nuts with her teeth; none of them recognizing that the splitting of the root was a godsend and that the original caries was the serious misfortune. This is but a short history of a small cavity in the lateral incisor.

Who among us thinks over the future dental history of each tooth, as well as all the teeth, as we serve our patients from time to time? Until we can predict the dental future of our patients we will be unable to guide them thru a long life with the best possible results. So long as we continue to treat the needs of our patients from day to day, so long should we be classed as tinkers having no thought for the morrow.

If we are now convinced of the importance of looking into the future dental history of our patients, what are the effects of the wear of the teeth upon the occlusion, facial contour, the pulp, our former dental operations and the periodontal membrane, on the soft tissues and what prophylactic remedies may be instituted to, as far as possible, minimize any baneful consequences?

Before a body of this kind, it is not necessary to do more than point out the necessity and direct the way and the rest will follow. Preventive measures based upon a knowledge of the structures involved, the forces at work and the history of many cases gone before, will do much for the dental future of our patients comfort and health, as well as great good to the profession.

If someone would write the dental history of several patients it would awaken in the minds of the profession a realization of the shortcomings of their calling which would forever do away with such expressions as permanent denture, permanent fillings, guaranteed crowns, fillings, etc.

THE CLASSIFICATION OF THE STATE DENTAL EXAMINING BOARDS AND THE CREATION OF A BODY TO BE DESIGNATED AS THE NATIONAL BOARD OF DENTAL EXAMINERS FOR THE UNITED STATES.

By Wm. H. G. Logan, Colonel, Medical Corps, N. A., U. S. A

(Read before the House of Delegates of the National Dental Association, Chicago, Ill., August 5-9, 1918.)

THE CLASSIFICATION OF THE STATE DENTAL EXAMINING BOARDS BY THE DENTAL EDUCATIONAL COUNCIL OF THE UNITED STATES.

AT THE annual meeting of the National Dental Association held at Old Point Comfort, Virginia, 1907, the initial steps were taken which led to the organization of the Dental Educational Council of America, a body originally composed of three members each from the National Association of Dental Faculties, National Association of Dental Examiners and the National Dental Association, and this Dental Educational Council of America was instructed to inspect and classify the dental colleges of this country and report their findings for approval to each of the bodies represented by that committee.

Congress specified on October 6, 1917, or ten years later, "that all regulations concerning the enlistment of Medical Students in the Enlisted Reserve Corps and their continuance in their college courses, while subject to call to active duty, shall apply similarly to Dental Students," and these regulations pertaining to Medical Students have definitely specified that Medical Students should only be permitted to enlist in the Enlisted Reserve Corps of the Medical Department when they were in attendance upon Medical Schools that had been classed by the Surgeon General's Office as well recognized. Therefore, it became a legal necessity that the Surgeon General's Office be furnished with an authentic list of the well recognized dental schools of this country. Under the urgency of this situation, your President submitted to the Surgeon General a list of Dental Schools that had been accepted as a worthy Dental Institute by the National Faculties' Association and in the Association of Dental Colleges of American Universities. This list of Dental Schools, when presented to the Surgeon General, was accepted, at that time, as the group to be specified as well recognized Dental Institutions, and their students were permitted to enlist in the Enlisted Reserve Corps of the Medical Department.

On January 23, 1918, at the annual meeting of the American Institute of Dental Teachers held at Pittsburgh, Pennsylvania, a request was made on behalf of the Surgeon General by Lieut. Col. Arnold, M. C. N. A., that the Dental Educational Council of America complete a classification of the Dental Schools and submit it to the Surgeon General for his consideration. This request was unanimously concurred in

by the American Institute of Dental Educational Council of America and is ready for final acceptance. The action taken will be reported to you thru its Secretary, Dean Henry L. Banzhaf, at a mutually agreeable hour during this meeting, but before taking up the two main thoughts that I desire to bring before you, it should be definitely stated that the Surgeon General of the Army has not asked any association or committee to decide for him what school is to be or not to be considered as well recognized, as that prerogative is reserved to himself, but he has requested that the Educational Council of America, the membership of which represents the schools, the examining boards, and the dental profession, should express to him its concensus of opinion as to what constitutes a well recognized school, and what dental schools, in its opinion, are well recognized, and any additional data or classification that they wish to submit, that he may be in a position to quickly reach a final decision when any Dental College thinks its classification has been unjust.

I have now reached the point where I desire to make certain statements to amplify two definite recommendations for the consideration of the House of Delegates, for this body represents all the possible interests involved in the Dental welfare for America. The various State Dental Examining Boards, singly or collectively, thru their State or National Association, besides determining with finality who shall and who shall not practice dentistry in the respective states of the Union, definitely prescribe what the qualifications of a student must be, both as to age and education, before he can enter upon the study of Dentistry; also defines, after his acceptance, the length of time said student must devote to dental instruction and the subjects he must pursue. Because of these facts, they have largely influenced the nature of the instruction to be imparted to the student body.

After considering the great power exercised by the State Dental Examining Boards, and the weight and importance given their findings in the determination of the classification of Dental Schools, the following idea has presented itself to me in such a positive form, I feel called upon to affirm that in view of the fact that the examining boards have failed to give definite evidence to the profession or to the teaching institutions of the country, that they have arrived among themselves at a satisfactory adjustment of a plan or the adoption of regulations which would give sufficient uniformity as to make the result just to themselves, just to the Dental Schools and just to the applicants who appear before them for license to practice, is it not, therefore, fair, appropriate and equitable that we ask for the same classification and standardization of the examinations given by the various State Dental Examining Boards as has been demanded and granted in reference to the classification of Dental Schools? Believing that it is and because of the great benefit that would accrue to Dental Education, I respectfully suggest that it be made the duty of the Dental Educational Council of America to investigate the different methods employed by the various State Boards to ascertain the professional fitness of men who seek to secure license to practice Dentistry, and upon their findings classify the various State Boards into the same grades that Dental Schools have been or are to be classified at this meeting.

In accordance with the ideas expressed, the recommendation is made that a resolution emanate from the House of Delegates, requesting that the Dental Educational Council of America shall, in addition to their present duties, inspect and classify the various State Dental Examining Boards and report

their findings for approval. Furthermore, that $500 be appropriated from the Treasury of the National Dental Association to assist in defraying the expenses incurred, and that an appropriation of $200 be requested from the National Dental Examiners and the National Dental Faculties' Association, and $100 from the Association of Dental Schools of American Universities.

THE CREATION OF A BOARD TO BE KNOWN AS THE NATIONAL BOARD OF DENTAL EXAMINERS FOR THE UNITED STATES.

It is probably a correct statement to make that soon after the establishment of the first Dental Colleges of this country, the wisdom of the creation of an authoritative examining board to which Dentists could appear for license and be furnished a certificate to practice, and have said licensure be recognized in any state or territory or extra-territorial possessions, upon presentation of the official credentials of this National Board, without being required to present himself for another examination. Practically all members of the profession have been in agreement that dental reciprocity is an ideal devoutly to be sought, but to date no practical solution, if presented, has been accepted. Therefore, I take the liberty of bringing this subject before you again. To my mind, one of the essential preliminary steps necessary to secure Dental reciprocity, is to be found in the need for the classification and standardization of the dental examination given by the various state dental examining boards, for example: If only a few of the state boards which are worthy of being designated as Class "A," and whose dental laws would permit, should co-operate with a National Board of Dental Examiners, the membership of which had been selected from the National Dental Examiners' Association, the Dental Colleges of this country and the National Dental Association, and an agreement had been reached to a uniform procedure to test the practical and professional knowledge of the applicants, and a single set of questions prepared for the examination to be held in each state on the same day, and protecting all steps in the test leading to license in the same manner that the United States Army and Navy and Civil Service organizations protect their examinations from fraud, altho held in different parts of the country at the same time, is it not fair to assume that these state boards could reach an agreement among themselves that any man who passed such an examination satisfactorily could be granted reciprocity in the states participating in this act, for the duration of his life, providing he presented, in addition to his original certificate of license, credentials as to his moral and professional standing at the time he desired to change his location from his home state dental examining board?

If the question of classification of state dental examining boards and the establishment of a National Board of Dental Examiners for the United States is approached with sincerity and honesty of purpose the subject warrants the necessary funds to carry the work forward can be secured. Therefore, my second recommendation is respectfully submitted for your decision:

It is recommended that this body appoint a committee of five who shall devise ways and means for the creation of a board to be known as the National Board of Dental Examiners of the United States, and said committee be ordered to report its conclusions for approval and adoption to the House of Delegates at the next annual meeting of the National Dental Association.

REPORT OF DENTAL EDUCATIONAL COUNCIL OF AMERICA.

Chicago, Ill., August 5, 1918.

To the National Dental Association:

Gentlemen:—As Secretary of the Dental Educational Council of America, and in accordance with the provisions of Section 3 of our Constitution and By-Laws, I herewith submit to you a report of the work accomplished by this body at its session just closed.

The meeting was called to order by President Albert Midgley, on July 31, at 11 o'clock A. M., and closed on August 3, at 12 o'clock P. M.

For obvious reasons I will limit myself in this report to a summary of the work actually accomplished.

The following amendments to our minimum requirements for Class "A" dental schools were unanimously adopted. A copy of the original printed pamphlet is hereby inserted, marked "Exhibit A," and made a part of this report.

EXHIBIT "A"

Dental Educational Council of America
1917-1918

Albert L. Midgley, President, Providence, R. I.
J. V. Conzett, Vice-President, Dubuque, Iowa.
Henry L. Banzhaf, Secretary-Treasurer, Milwaukee, Wis.
John H. Baldwin, Louisville, Ky.
L. L. Barber, Toledo, Ohio.
Thomas J. Barret, Worcester, Mass.
H. E. Friesell, Pittsburgh, Pa.
S. W. Foster, Atlanta, Georgia.
Louis Meisburger, Buffalo, N. Y.
A. R. Melendy, Knoxville, Tenn.
M. J. Moran, Deming, N. M.
A. H. Reynolds, Philadelphia, Pa.
B. Holly Smith, Baltimore, Md.
George N. West, Chicago, Ill.
Herbert L. Wheeler, New York City.

MINIMUM REQUIREMENTS

For Class "A" Dental Schools, Adopted by the Dental Educational Council of America, at Louisville, Kentucky, July 24, 1918—Revised at New York City, October 22, 1917, and March 26, 1918.

ADMINISTRATIVE POLICY

Section 1. (a) The administrative policy of the school must be satisfactory to the Dental Educational Council of America. The Dean or other executive officer must hold and have authority to carry out fair ideals of dental education.

(b) The value of the building and equipment (grounds excluded) must be equal to at least $300.00 for every student enrolled.

(c) The school must have facilities and equipment for at least twenty-five students in each class.

ENTRANCE REQUIREMENTS

Section 2. (a) The requirements for entrance shall consist of graduation from an accredited high school or academy which requires for graduation not less than fifteen units of high school work obtained in a four-year course beyond the eighth grade of the elementary school. No conditions on the foregoing entrance requirement shall be allowed.

(b) An accredited high school is defined as one which is accredited as a four-year high school by the United States Bureau of Education, or by a university which is a member of the Association of American Universities or by the State University of the state in which the high school is located.

(c) In the case of an applicant who is not a graduate from a high school or academy, as defined above, the full equivalent of such education in each individual case must be established and attested to by the highest public educational officer of the state in which is located the dental school which the applicant seeks to enter.

(d) The entrance credentials of each student enrolled must be kept on file and open to general inspection until after graduation. Not later than sixty days after the opening of school the Dean shall send to the Secretary of the Dental Educational Council and to the Secretary of the local State Board of Dental Examiners a complete list of the students enrolled, together with a sworn statement that each student is possessed of the entrance qualifications outlined above.

(e) Students with two full years credit from Class "A" Medical Schools, approved by the American Medical Association, may be admitted to the sophomore class. No other advanced credit in time may be given in any other case than above specified. No special students shall be accepted unless they are in possession of the entrance requirements specified above.

(f) The foregoing regulations apply to all students including those from foreign countries, and regardless of where

the applicant expects to practice his profession.

COURSE OF STUDY

Section 3. (a) Beginning with the session 1917-18 the course must be four years in length, each year to consist of thirty-two weeks and six days in each week. No degrees other than Doctor of Dental Surgery, Doctor of Dental Medicine, or Doctor of Dental Science may be given. Dental subjects may be taught thruout the entire four years. Schools that offer a three-year course with one year of college work as a prerequisite shall not be regarded as satisfactory.

(b) The school must offer a course of at least 4400 hours laboratory and didactic instruction.

(c) The minimum hours devoted to each branch shall be as follows:

Operative and Clinical Dentistry	1300
Prosthetic Technics	384
Crown and Bridge Technics	320
Operative Technics	160
Oral Hygiene	32
Dental Anatomy	96
Orthodontia	96
Oral Surgery	96
Physics, Biology, or Both	192
Chemistry (Inorganic—Organic—Physiological—Metallurgy)	320
Technical Drawing	48
Anatomy	320
Histology	128
Pathology (General and Dental)	128
Materia Medica	64
Bacteriology	128
Physiology	128
Dental Rhetoric	96
Physical Diagnosis, Anesthesia	32
Radiology	32
Jurisprudence, Dental History, Ethics, Economics	32
Additions to Above, or other subjects	268
Total	4400

TEACHING FACILITIES.

Section 4. (a) The classes in dentistry must be taught separately from the classes in any of the other departments, if the dental school in question is part of a university.

(b) The patronage of the infirmary clinic must be such as to give each student at least 150 operations in fillings (gold, inlay, amalgam, cement, root fillings, etc.) prosthetic work, and orthodontia. Treatments preparatory to the above, and cases of exodontia must not be included in the number stated above.

(c) In the anatomical laboratory not more than eight students, working in pairs, may be assigned to one cadaver for a complete dissection.

(d) Every twenty students working in the infirmary at any given time must have the undivided services of at least one demonstrator.

(e) Every thirty students working in the scientific laboratories must have the undivided services of at least one instructor.

(f) Every forty students working in the technic laboratories must have the undivided services of at least one instructor.

(g) No persons except those holding the D. D. S., M. D., or bachelor's degree or equivalent, or who hold a license to practice dentistry, shall be employed as instructors.

LABORATORIES AND OTHER FACILITIES.

Section 5. (a) The school must be possessed of the following number of laboratories and class rooms, equipped in the following manner:

(b) One chemical laboratory equipped to adequately teach qualitative, quantitative, general inorganic and organic chemistry and physiological chemistry.

(c) One microscopical laboratory equipped with sufficient high power microscopic so that each student may be possessed of the use of a microscope when he is working in the laboratory.

(d) Sufficient class rooms—at least one of which must be equipped with lantern for projection.

(e) Sufficient technic laboratories, so that each student in attendance is provided with an individual place for laboratory work.

(f) A dental infirmary, equipped with a sufficient number of dental chairs to adequately serve the senior class. An efficient equipment for sterilizing students' instruments must be provided.

(g) An X-ray outfit for use in conjunction with the dental infirmary.

(h) A dental library constantly available to the students, which shall have at least twice the number of volumes as there are students enrolled in the school.

STATE BOARD RECORD

Section 6. The school must not have more than twenty-five per cent failures before the various State boards more than two years in succession.

ATTENDANCE

Section 7. The record of attendance required of students must not be less than eighty-five per cent for each year.

PROMOTION OF STUDENTS.

Section 8. (a) A student who has incomplete course conditions, or failures, in 60% of his course for any semester shall be dropped.

(b) A student may not be promoted if he has incomplete conditions or failures in more than 20% of the course of any year.

(c) A student who fails to remove a condition or failure within twelve months from the time it was incurred shall automatically be dropped from the school.

(d) An incomplete course is one that has not been completed because of illness or other personal emergency.

PASSING MARK, CONDITIONS AND FAILURES.

Section 9. (a) The passing mark shall be 75%.

(b) A grade between 60 and 74% is defined as a condition.

(c) A grade below 60% is defined as a failure.

(d) A condition may be removed by examination.

(e) A failure may not be removed except by repetition of the course in part or entirely, i. e., by additional work under instruction approved by the Dean or the professor in charge of the subject.

(f) A condition which is not removed within thirty days of the opening of the next year, automatically becomes a failure and can then only be removed by a repetition of the course.

(g) If a school grades by letters it shall state (publish) definitely the percentage range value of each letter used in designation of standings.

CLASS "B" DENTAL SCHOOL DEFINED.

Schools which in certain particulars do not meet the requirements for Class "A," but may become eligible for Class "A" without complete reorganization.

CLASS "C" DENTAL SCHOOL DEFINED.

Schools which could not meet the requirements for Class "A" without very extensive improvements and a complete reorganization. Class "C" schools shall be considered "not well recognized dental schools."

TRANSFER OF DENTAL STUDENTS

Students of dental schools which have been well recognized but lost this recognition may transfer to well recognized dental schools, if acceptable to these schools. Such students may be accepted as far as entrance requirements are concerned on the requirements of the school in which the student began the study of dentistry.

Under Section 1, "Administrative Policy," another subdivision was added as follows:

"The conduct of a dental school for profit to individuals or a corporation does not meet the standard of fair ideals, as interpreted by the Dental Educational Council of America."

Under "Entrance Requirements," Section 2 (a), the following amendment was made: In the fourth line of the paragraph the following words were stricken out, "beyond the eighth grade of the elementary school," so that when amended this section reads:

"Section 2. (a) The requirements for entrance shall consist of graduation from an accredited high school or academy which required for graduation not less than fifteen units of high school work obtained in a four-year course. No conditions on the foregoing entrance requirement shall be allowed."

Under Section 7, "Attendance," the following words were added:

"Attendance shall be counted from the close of registration," so that when amended this section shall read:

"Section 7. The record of attendance required of students must not be less than eighty-five per cent for each year. Attendance shall be counted from the close of registration."

Under the head of "Promotion of Students," Section 8 (a) following amendment was adopted: Strike out the word "course" as it occurs in the first line of the paragraph, and substitute therefor the word "courses;" strike out the word "conditions;" strike out the word "60%" and substitute therefor the word "40%," and add to the end of the paragraph the words "from his class," so that when amended Section 8 (a) shall read as follows:

"Section 8. (a) A student who has incomplete courses or failures in 40% of his course for any semester shall be dropped from his class."

Under Section 8 (b), the word "incomplete" was struck out, so that it reads:

"Section 8. (b) A student may not be promoted if he has conditions or fail-

ures in more than 20% of the course of any year.

The following classification of dental schools was adopted:

CLASS "A"

University of Southern California, College of Dentistry, Los Angeles.
University of California, College of Dentistry, San Francisco.
Northwestern University Dental School, Chicago, Ill.
University of Illinois, College of Dentistry, Chicago, Ill.
University of Iowa, College of Dentistry, Iowa City.
University of Michigan, College of Dentistry, Ann Arbor.
University of Minnesota, College of Dentistry, Minneapolis.
Creighton University Dental School, Omaha, Nebraska.
Ohio State University, College of Dentistry, Columbus.
North Pacific Dental College, Portland, Oregon.
University of Pittsburgh, College of Dentistry, Pittsburgh, Pa.
The Thomas W. Evans Museum and Dental Institute, University of Pennsylvania, Philadelphia, Pa.
Medical College of Virginia, School of Dentistry, Richmond, Va.
Marquette University, College of Dentistry, Milwaukee, Wis.

TENTATIVE CLASS "A"

Harvard Dental School, Boston, Mass., and Tufts Dental College, Boston, Mass.
Classification withheld until these schools meet the Council's requirements respecting the evaluation of Entrance credentials. When this is done they automatically pass into Class "A."

CLASS "B"

Colorado College of Dental Surgery, Denver, Colo.
Georgetown University, School of Dentistry, Washington, D. C.
Howard University Dental School, Washington, D. C.
Atlanta-Southern Dental College, Atlanta, Ga.
Louisville University, College of Dentistry, Louisville, Ky.
Chicago College of Dental Surgery, Chicago, Ill.
Indiana Dental College, Indianapolis, Indiana.
Loyola University, School of Dentistry, New Orleans, La.
Baltimore College of Dental Surgery, Baltimore, Md.
University of Maryland, Dental Department, Baltimore, Md.
St. Louis University, College of Dentistry, St. Louis.
Washington University Dental School, St. Louis.
Kansas City Dental College, Kansas City, Mo.
Western Dental College, Kansas City, Mo.
University of Buffalo, Dental Department, Buffalo, N. Y.
New York College of Dentistry, New York.
College of Dental and Oral Surgery of New York.
Western Reserve University Dental School, Cleveland, Ohio.
Ohio College of Dental Surgery, Cincinnati, Ohio.
Philadelphia Dental College, Philadelphia, Pa.
Vanderbilt University, School of Dentistry, Nashville, Tenn.
University of Tennessee, College of Dentistry, Memphis, Tenn.
Meharry Dental College, Nashville, Tenn.
College of Physicians and Surgeons, Dental Department, San Francisco, Calif.
George Washington University Dental School, Washington, D. C.

CLASS "C"

Lincoln Dental College, Lincoln, Neb.
College of Jersey City, N. J.
Cincinnati College of Dental Surgery, Cincinnati, Ohio.
State Dental College, Dallas, Texas.
Texas Dental College, Houston, Texas.

The treasurer's report was audited and adopted. A copy of this is hereto attached, marked "Exhibit B," and made a part of this report. From an analysis of this report it was decided that not less than five thousand dollars ($5,000) would be needed to carry on the work of the Council for the ensuing year. The following resolution was unanimously adopted:

"Resolved, that the Secretary be, and hereby is, instructed to request of the National Dental Association a contribution of two thousand dollars ($2,000), of the National Association of Dental Examiners a contribution of one thousand dollars ($1,000), and further that all dental colleges in Classes "A" and "B" be requested to submit to an assessment of 25 cents per student enrolled, based on last year's enrollment."

Respectfully submitted,
HENRY L. BANZHAF,
Secretary-Treasurer.

ELECTROLYTIC MEDICATION WITH SPECIAL REFERENCE TO IONIC CHEMISTRY.

By George T. Fette, D.D.S., Cincinnati, Ohio.

(Read before the National Dental Association at Its Twenty-First Annual Session, New York City, N. Y., October 23-26, 1917.)

IN THE brief time allotted to me in which to present my paper you understand our subject can not be as exhaustively treated as its importance really demands. Indeed the time allowed me is insufficient even for the limited scope of my subject which should outline the ionic chemistry, one of the many phases and sub-phases which summarily apply to the process of electrolytic medication. Fortunately for this grand national convention there will be several speakers on the subject of electrolytic medication who surely will supply of whatever interest I may be wanting.

We might do well in the outset to have it settled in our minds that electrolytic medication is primarily a pharmacological therapy i. e. a transference of ponderable material (the ions) into the tissues which we wish to treat. Primarily and principally, then, we are concerned with the introduction of certain elements of drug which we accomplish by means of the galvanic current. For therapeutic effect we rely, subsequently upon the chemical reaction which takes place between the ionic drug and the tissues, be these latter the cells of our body or those of the micro-organisms which we wish to destroy.

The introduction of ions at the site of medication may secondarily modify the chemical constitution of other parts of the body such as joints, fibrous tissues or nerves by displacement of the ionic equilibrium of the various electrolytes in the path of the electric current; for this displacement is even necessary since for each definite number of positive ions we introduce at one electrode, we must eliminate from the electrolytic content of the body the same number of negative ions at the other electrode or vice-versa. But this secondary modification for our object and aim, may be safely disregarded since displacement of ionic equilibrium is constantly going on in our body for the purposes of assimilation which depend on the osmotic conditions of the body fluids, especially of those of the electrolytes.

While it is true that the number of positive and negative charges must always be equal, whether this be in our body or in any other solution, it does not follow that their total number must be the same before and after electrolytic treatment. In the absence of chemical reaction while electric conduction is going on the total number of charges should remain constant. If, however, chemical interaction does take place then the total number of ions in the body should become less. This may be readily shown by the following equations:

$$\overset{+\,-}{NaCl} + \overset{+\,-}{KNO_3} \rightleftarrows \overset{+\,-}{KCl} + \overset{+\,-}{NaNO_3}$$

$$\overset{+\,-}{NaCl} + \overset{+\,-}{AgNO_3} \rightarrow \underline{AgCl}\ \overset{+\,-}{NaNO_3}$$

In the first example we have no chem-

ical change and the number of electric charges is the same on both sides of the equation. This reaction is a reversible one as is indicated by the double arrow. In the second equation chemical reaction has taken place; insoluble Silver Chorid is precipitated which is unionized and the total number of electric charges of the entire system has been diminished. From the foregoing we deduce the scientific explanation for the prolonged therapeutic action of the ions after their introduction by the current. Dr. Lewis Jones speaks of this action as perduring for the limit of two weeks. It may be presumed that interaction between the ions and the cell-contents of the tissue is instantaneous with the initial application of the current and continues until the isotonic equilibrium of the respective reagents is reached, after which the introduced ions accumulate by simply displacing other ions which existed in the tissue prior to the current or by creating hypertonic conditions for the time being.

We stated above that electrolytic medication is a pharmacological therapy—a drug action in the full sense of the word —and if we hold to this distinction and bear in mind that the electricity which we employ plays no role in the therapy save for the transport of the material, it is apparent that our best results in electrolytic medication must come from a study of the action of drugs and their chemistry. We are taught that some drugs are effective on account of the action of their molecules as units and that some drugs act by virtue of their atoms, radicals or ions.

In our particular work at hand we are only concerned with ions and any drug that does not yield ions upon being dissolved in the proper solvent can not be employed as an ionic medicament. Fortunately a large number of drugs which we ordinarily apply topically may be employed in the electrolytic method. Even drugs commonly considered incapable of forming electrolytes may be used in this way as Dr. Sturridge assures us in the case of Argyrol. There is a strong tendency today towards the belief that all chemical action is ultimately of an ionic nature on account of the phenomenon known as "progressive ionization," i. e., the formation of new ions as fast as prior ions are being used up in new chemical formation. The belief is inductively based on the quantative tests made upon an ever increasing number of organic compounds with regard to their "ionization constant."

There may be some vague haziness in the minds of some of my audience as to the real meaning of ionic chemistry as distinguished from a chemical action in general. To make this point clear let us consider the three following equations:

(1) $Ag\ No_3 + HCl = AgCl + HNO_3$

(2) $(Ag^{+} + NO_3^{-}) + (H^{+} + Cl^{-}) \rightarrow \underline{Ag\ Cl} + (H^{+} + NO_3^{-})$

(3) $Ag^{+} + Cl^{-} \rightarrow \underline{Ag\ Cl}.$

In the first equation we symbolize a simple chemical fact, namely that when Silver Nitrate is added to Hydrochloric acid there is formed Silver Chlorid and Nitric Acid. In the second equation we state the same fact but in addition we show the details of the reaction. You note Silver Nitrate is split up into two components, the silver atom taking a positive charge of electricity and the Nitrate radical a negative charge. This always happens when solid silver nitrate is dissolved in water. This phenomenon is called ionization. The two components are called ions because being precisely in this condition—simply dissolved in water—they would move with the electric current if the latter were applied. You note furthermore that these electric charges come into existence in the absence of any electric current. Whence are these charges derived? The expla-

nation is this: Silver Nitrate in the solid state has a different content of chemical energy than it has in the dissolved condition, and this difference of chemical energy is represented as transformed electrical energy which could be actually obtained as electricity if the system were arranged in the form of a battery. The same consideration applies to the Hydrochloric acid as it did to the silver nitrate. Now these two ionized substances, coming together, enter into chemical combination with one another. Upon closer inspection of equasion (2), we observe that chemical combination was not between the two substances, $AgNO_3$ and HCl but between the ions of these two substances, the curved arrow showing that the real chemistry of the whole system exists in the union between the silver-ion and the chlorin-ion. The AgCl is underlined to indicate that it is the precipitate. Why silver-ions and chlorin-ions always unite is explained by what is known as the "solubility" product of these ions. Now the Nitric acid which is formed remains ionized so that its ions after the reaction are in the same condition as they were before chemical change took place. The same ions appearing on both sides of the equation may be cancelled out, leaving an expression which is shown in equation (3) which is known as an ionic equation and which is always valid in the case of any silver and any chloride salt. (An acid being a salt in the wide sense).

The simple chemistry just described may be applied in a practical way to a pharmacological reaction. Suppose we wish to treat an infected part, say a putrescent root canal, and we want to destroy the germ by an antiseptic agent like Zinc Chlorid. The germ-body is an albumin of a very intricate formula which for brevity and convenience we may symbolize as HX, letting X represent the sum total of the elements Carbon, Oxygen, Nitrogen, Sulphur, etc. The chemical reaction may be written as follows:

$$ZnCl_2+2HX\rightarrow ZnX_2+2HCl.$$

Here the ion Zn displaces the hydrogen of the living albumin making of it insoluble Zinc albuminate (ZnX_2) which fact is commonly indicated as albumin coagulation or precipitation of albumin. It might be profitable at this point to distinguish between heat coagulation and a chemical formation of an albuminate. Heat coagulation might indeed produce death but it is really distinct from the chemical salt termed an albuminate such as we obtain by the action of the acids and the salts of the heavy metals. The albuminates chemically formed have different physical properties according to the chemical reagents employed. Thus silver ion produces an insoluble albuminate which becomes self-limiting because the reagent can no longer pass thru it, once a definite thickness is formed. Mercury also produces albumin coagulation but this coagulation is redissoluble in the body fluids so that it is really not self-limiting. Hence the great danger of mercuriol drugs. Zinc ions form a flocculant precipitate which does not exclude further passage of fresh ions into the deeper structures. Zinc is therefore an ideal ion both in ionic and in electrolytic medication. The nature of the coagulation is often a great factor in our selection of a drug. Referring to our equation again we note another product, namely, Hydrochloric acid. This bi-product is always necessary in a double decomposition reaction and in Pharmacology it is considered either as a stimulant or as an irritant, but if we had employed Zinc Acetate instead of the Zinc Chloride we would have obtained a much weaker acid as a bi-product, namely, Acetic acid.

$$Zn(C_2H_3O_2)_2+HX=ZnX+2HC_2H_3O_2$$

It is for this reason why organic com-

pounds are more preferable than the inorganic salts. The chemical reaction thus outlined is precisely what takes place when we apply $ZnCl_2$ topically and the action taking place, as it does, between the ions may be properly designed as ionic medication. Hence the term ionic medication is not correctly employed when we wish to indicate by it the electrolytic method.

We have now arrived at a point where we can raise the question: Does the electrolytic method of treatment produce the same chemical reaction as the above?

We answer the above question by stating that the real chemistry is the same as far as the formation of the albuminate is concerned and that *the undesirable bi-product which we designated as an irritant can not be formed,* because in the electrolytic method we introduce only one of the two ions (positive or negative) of which every drug must consist. Right here, ladies and gentlemen, we meet face to face with an essential distinction between the topical and the electrolytic methods of which, I think I am the first to make mention. We know positively that we do not introduce that characteristic ion of which the bi-product is composed, on the contrary, since the component ions of a drug migrate in opposite direction, we remove that ion more and more from the site of medication. You may now justly force this other interrogation upon me: What becomes of the hydrion of the albumin? To this question we can offer four possible solutions (1) the hydrion may combine with anions already present in the cell, (2) it may react with additional albumin in the same capacity as the ion introduced, (3) it may remain as a cation in a new static equilibrium or (4) it may migrate out of the cell with the positive phase of the current since its migration velocity is five times that of most ions which we would introduce. The probability is not excluded that all four events may take place in the same cell.

Some of these events afford extreme interest, especially number (3). By the ordinary method of injecting cocaine for local anesthesia, the anesthetic is infiltrated into the interstices of the tissue where it soon passes into the lymph tract and is carried away after its motor-construction power has diminished. This explains the limited duration of local anesthesia. We know that when cocaine is injected into dead tissue it may after a while be recovered unchanged whereas when it is introduced into life tissue it soon breaks up into methyl-alcohol, benzoic acid, and ecgoin. Hence we conclude that this dissolution of the cocaine is attributable to the action of living protoplasm. By the electrolytic method anesthesia lasts from four to five hours and the tissues remain completely blanched during all this time. The explanation is briefly this: Cocaine being a basic alkaloid takes the position of the cation and upon entering the cell the cocaine-ions accumulate and remain in static equilibrium as a store-supply for gradual elaboration by the protoplasm, very much after the fashion of ordinary metabolism.

A study of chemical changes of whatever kind must include due cognizance of the Physical concomitants of those changes. In the laboratory these concomitant changes can be readily observed. The production or consumption of heat is a physical feature of a chemical change. The production or consumption of electricity is another. The production or consumption of work, or mechanical energy, is another. These and a few other physical concomitants are in the main transformed energies derivable from the internal or chemical energy of the substances involved in the chemical reaction. In the living economy these physical changes are not so readily observable except the one of heat which is therefore a very important feature as a measure of chemical change in biological chemistry. Heat, indeed, as the basis of thermo-chemistry is a true

equivalent of chemical change and is our most direct means of arriving at the energy content of a chemical substance. It is also our chief means of determining the difference in energy content between a substance ionized and non-ionized. To be convicted of this fact, one need only ionize, or dissolve, solid sodium hydroxide to the extent of a normal solution and observe the temperature rise. Now, in electrolytic medication where we are concerned with ions only you readily see that we are dealing with varying chemical energy content. While this purely chemical aspect of the ions forms a weighty problem as it is, we are still more particularly concerned with their chemical physics. When we apply a drug topically we have to depend for the difusibility of this drug upon the relative osmotic pressure of the tissue medicated and the drug or as some put it upon the diffusion coefficient of the drug. Either our drug must be hypertonic or at least isotonic not considering any defensive ferments which the life cells may possess for counteracting impenetrability. In the electrolytic method we dominate all osmotic conditions; we can introduce ionic material in quantities which obey Faraday's "laws of electro-chemical change," i. e., a chemical equivalent of an ion being transported into the tissue for each Faraday (or 96540 Coulombs) of electricity. It is true for each equivalent which we transport at one electrode a corresponding equivalent of some other ion must be equal as we said above, as far as the whole body is concerned, but their relative distribution need not be uniform, i. e., their concentration may be different in different parts of the body. In fact the concentration must be different, at least, immediately after the passage of the current because the migration velocity of each ion is not the same. Suppose a collection of cells contained only hydrions in static equilibrium with some indefinite anion and we desired to pass in silver ion. Now, since the velocity ratio of hydrion to the silver ion is as 5 is to 1, five hydrions would pass out while only one silver ion passed in i. e. the ionic concentration would be reduced to one-fifth its original value. Of course by proper selection of ions the concentration might have been equally as well been increased. It is now apparent how readily we can influence the concentration while the current is on, disregarding for the present whatever chemical change might take place. After the current is turned off a new readjustment of static equilibrium will set in depending upon the actual amount of chemical change taking place, i. e., on the amount of ions used up in chemical formation, for the ions used up are virtually removed from the system. This static equilibrium in relation to the actual chemistry taking place not only bears a close resemblance to the law of "Mass Action" but it really includes it so that electrolytic medication offers us a very powerful means of storing up the reacting factors in the formula of the above law.

Ionic chemistry from the very inception of the electrolytic dissociation theory as Arrhenius propounded it (1889) began to clear up many problems in physical chemistry which before had never been satisfactorily explained. It was the stepping stone to Van't Hoff's great discovery of the law of dilute solutions which is now regarded as the greatest achievement in chemical science for bringing a dissolved substance under the same law as the gases. This law is the more especially valued because it links into one chain as it were, all the separate discoveries and hypotheses of Boyle, Gay-Lussac, Avogadro, Faraday, Pfeffer, Kohlrauch, Hirtoff and of many others. The whole fabric of physical chemistry has now been solidly reconstructed upon the ionic theory. It is indeed a very interesting study of how many facts of ionic chemistry could be

collected and directly applied to our work at hand and if time permits, I would touch upon one other question, which should receive considerable recognition in electrolytic medication and that is the relationship of ions to colloid substances.

In my original article contributed to the Dental Cosmos in the March issue of this year on "the present standing of electrolytic medication with a discussion of a few basal principals therein applied" I alluded to this relationship in the following words: "In conclusion the writer would exhort those members of the profession now practicing electrolytic medication to turn their attention to, or try out, the application by means of the galvanic current of Dr. Martin H. Fisher's salt solution in oedematous conditions about the mouth. It is not known to the writer whether or not Fisher's salt solution has been introduced in this way. Certainly, these solutions, being specifically employed as electrolytes, could be easily introduced into the tissues by the current especially since neither cataphoretic nor anaphoretic transport is intended but primarily, only that of either the positive or negative ions of the solution."

I consider this a very opportune occasion to give you a concise dissertation of my claims made in the words above quoted, but before so doing allow me to briefly answer a criticism offered by Dr. Sturridge of London upon the same quotation in the Dental Cosmos of August, this year. In the first place Dr. Sturridge fails to quote me correctly. To show that he does not quote me correctly I repeat his words: "In his conclusions" he exhorts the profession to try out the application by means of the galvanic current of Dr. Martin H. Fisher's salt solutions in oedematous conditions of the mouth." In reality my text reads as follows: "In conclusion the writer would exhort *those members of the profession now practicing electrolytic medication* to turn their attention to, and try out, the application by means of the galvanic current of Dr. Martin H. Fisher's salt solution, etc." You readily note exhorting *the profession* and exhorting *those members of the profession now practicing* electrolytic medication, are two different things. Accept either text or context of my writing and you must agree with me that I am sufficiently safeguarded against the inputation which one might deduce from Dr. Sturridge's following two sentences. "According to this anyone may produce this solution and apply it electrolytically without understanding the principles of electrolytic dissociation of ions"—parenthetically; I do not understand what Dr. Sturridge means by "electrolytic dissociation of ions but I do know what is meant by electrolytic dissociation of *a substance or of a chemical compound*—the other sentence I quote is: "There is nothing better calculated to bring this useful method of treatment into utter disrepute than this." Furthermore such imputation is unfair in face of what I premised in my introduction and what I said of misconception with regard to ionization in my original communication referred to.

In the second place, I suspicion that Dr. Sturridge fails to grasp the real import of my contention. By Fisher's salt solution I understand any electrolyte which is calculated to precipitate certain suspensoids of colloidol nature which is responsible for the oedemous conditions in question. These electrolytes are employed either for their cations or their anions depending on the nature of the colloid. As far as I am aware Dr. Fisher applies those solutions either topically or by means of injection. Now from the context of my remarks anyone wishing to accept my exhortation should either already be familiar with Dr. Fisher's theory or he should at least consult his treatise, to which I refer in my bibliog-

raphy, before making any intelligent application.

Colloid chemistry, altho in its principle it dates back to Graham (1861), is only in recent times receiving serious study and is indeed already forming into a distinct science. Present indications are that colloid chemistry will stand second to none in importance for biological chemistry as most bodily fluids may be looked upon as suspensoid solutions. In a general way, and for brevity, we may state all solutions may be divided into two classes. Some are homogeneous and form what we commonly understand as true solution in which the two phases, the solute and the solvent are intimately mixed and can not be distinguished. Other solutions are rather heterogeneous and the two phases can be distinguished by some means or other. When a solid forms the solute phase we designate the solution a *suspensoid* and when the solute phase is a liquid we call the solution an emulsiod. When there is question of a precipitation of either of the above solutions we use the term coagulation for the first and gelatination for the second. Now either coagulation or gelatination can be brought about by the presence of some electrolyte, or ionized substance, differing only in amount for the respective solutions. Now do electrolytes coagulate or gelatinize these respective solutions? The explanation is this: the particles of the disperse phases are electrically charged either positively or negatively depending on the manner in which the colloid solution was prepared whether by chemical reduction, by electrical oscillation, or otherwise. That these particles are electrically charged is proven by the fact that they migrate to the electrode containing the opposite charge.

Now all electrolytes, as we know, consist of ions which are positively and negatively charged and when they come in contact with the electrically charged particles of the disperse phase, the electricity of the latter becomes neutralized by the charges of the ions which carry the opposite charge precipitation must follow of necessity. Let us bear in mind to precipitate any colloid solution we only need either the positive or the negative ions of the electrolyte. If the particles of the colloid are negatively charged we need the positive ions and if these particles are positively charged we need the negative ions. Now in electrolytic medication it is absolutely in our power to transport either the positive or the negative ions. Hence it is also absolutely in our power to precipitate any certain colloid. We are now able at this point to discuss the meaning of the terms cataphoresis and anaphoresis. Both terms mean a transport or conveyance, by means of electricity, of a salt or electrolyte *in toto or bodily,* i. e., a transport of an entire salt with both its positive and negative ions. But as I just showed you we do not require both ions for precipitation. The special distinction between the above term is this that cataphoresis means bodily transport to the cathode and anaphoresis bodily conveyance to the anode. The foregoing brief discussion finds ready application in oedematous condition. Colloids as certain tissues of the body, under acid or alkaline conditions, acquire great affinity for water, i. e., they swell up by virtue of water absorption probably due to surface energy which plays such an important role in colloid chemistry. If we can determine the electrical condition of the oedema we know precisely what ion to introduce. Not having made any personal investigation in this line, I rely upon Dr. Fisher's work on oedema for my guidance and accept the electrally negative condition of the smelling (which probably would be consequent upon chemical reduction processes in the tissue). If the assumption is correct any positive ions or cations would accomplish precipitation of the colloid and the water would have

to vanish. In practice I employ magnesium as the most favorable ion and I find the reduction of swelling a very simple matter with the electrolytic method as I recently published one out of a dozen of successful cases.

Discussion.

M. L. Rhein, New York City.

I feel very much embarrassed at opening the discussion on this paper. I only received a copy of the paper last night, and until I saw the program I was not even aware that I was to discuss the paper, altho I had been asked to do so, and the reason I feel embarrassed is because, in the first place, I do not consider myself competent to discuss the chemical side of this question.

The essayist has given us, as I have hastily read the paper, what appears to me the best elucidation of this subject that we have had up to date, and yet I am not able to discuss it from a chemical point of view. I suppose my name was put on the program because I have what I consider the fortunate honor of having been the first to introduce this therapy into dental work away back in 1894 and 1895, and I have been using it constantly in increasing ratio since then. I was somewhat surprised by the fact of what the essayist said about the effect of colloidal substances, because with my limited knowledge of chemical conditions, I have understood that colloidal substances were not subject to ionization, and I suppose it has been a misunderstanding of mine on the subject. The only way in which I can discuss this subject intelligently today is from the standpoint of the clinician which is purely an empirical one, which is as necessary to substantiate the scientific part of it as it is that the scientific part should substantiate the clinical, and I imagine the majority of this audience is situated very much as I am myself, that most of us are not capable of handling the subject from the side of the scientific chemist and put it in the magnificent way that Dr. Fette has placed it before us.

I would like to ask the essayist, when he closes the discussion on this subject, to devote a little more time in going into a detailed explanation of the difference between electrolyzation and ionization, and the question of whether the therapy we are using should be called electrolyzation or ionization, and whether there would be any difference in the nomenclature on this subject, if, for instance, for the anode we used a pure zinc wire with physiologic salt solution as a solvent, or whether an anode is of chlorid of zinc itself. I wish he would remember in answering this that he is not addressing a body of scientific chemists, and I say that in behalf of all of us who have become convinced of the therapeutic value of electrotherapy of this kind.

I would also like to have his opinion as to what the result of decomposition of the pure zinc anode was, whether we had chlorid of zinc or some other results?

In making these queries I place myself in the position of asking what may appear to be stupid questions to the essayist, but I am perfectly willing to place myself just where most of us are on this question.

We have learned that we can sterilize the periapical space with this form of electrotherapy; I do not know whether to call it electrolyzation or ionization. I am uncertain as to the meaning of the essayist.

In 1897, when I made my first contribution to this subject at a meeting of dentists, which was published in Items of Interest, I called it electrolyzation and ionization, but I am not in a position of knowing at present what to call it, and I think we should look to the essayist to help us out in this matter. Those of you who were present at the meeting of Section II this morning realize the clinical importance of this part of the subject because primarily this method can be utilized in the cure

of focal infections. I brought up the clinical fact that whether we call it ionization or electrolyzation, it matters little, but it is insufficient to eliminate the pathogenic condition, the septic condition, and the bacteria themselves, to take care of a focal infection. We can do it because bacteriologically we have proven that we do it. We have proven it because we have found it impossible to get cultures from the periapical region thru the ends of roots of teeth where we formerly obtained them. But the point I want to impress upon this audience in connection with this ionization medication propaganda is that these parts must now be sealed in such a way that they will be immune after that to infection, because, as the essayist has well said in one part in quoting from Dr. Jones, it is a question of hours only when we may expect a sufficient train load of bacteria in that region, and it is for that reason that those who practice that method believe in insulating the end of the roots of pulpless teeth, because in that way they are provided with a coat of armor against the attacks of any such micro-organisms, and when that train load of micro-organisms makes its appearance they are not going to remain at that station because there is no food there. They are going to starve to death there, whereas formerly they found pabulum, and consequently a favorable place for location. What I am saying, I am saying with a great deal of apology to the essayist because it is entirely out of keeping with his paper, but I do think it adds immeasurably to the interest of the subject if the clinical application is introduced in this way; otherwise I should prefer to have the Chairman of the Section not permit me to pursue this line of discussion.

There is just another point that I want to bring up as far as its clinical application applies. In a very interesting conversation I had with Dr. Sharpe, of Pasadena, California, he informed me after some careful experimentation, that it took exactly 45 milliampere minutes before the streptococcus was absolutely annihilated, and it brings up the point of the relative amount of chemical energy necessarily applied to destroy, first the micro-organisms, and, second, to get a pathologic state in such a condition that parts of the residue would be absorbed by the tissues. From a clinical standpoint, that is the most difficult point that meets the practitioner, because in all my discussions and conversation with men who are using this method, they are surprised at the great length of time that I give the current and the amount of power, but it confirms many clinical deductions of years of standing that we should give each individual case all of the power that the resistance of the parts will permit us to give. We are not able to give a dose of electrotherapy as you can a dose of something else. The human system by its resistance dictates to us how much of this energy it will take at a given time, and after a long list of patients we are using a straight voltage of 110 volts, it was found that not more than one milliampere of current could be passed thru the end of a root. Then again, that resistance is lowered, or in some cases we can run up to three or four or five milliamperes, but you will find it is a rare thing that you can get more than two or three milliamperes of current thru a tooth. You realize the amount of time necessary to use properly this form of electrotherapy, and I personally would like to get the comment of the essayist on this point.

In closing I would say this: when I first introduced this method in dental work, I did it with a great deal of hesitation, but there has not been a day since its introduction in 1894 that I have not been more and more convinced day after day of its great value in doing what we say it does. I have not been satisfied with the clinical results I have obtained from it in pyorrheal pockets. I have

not valued it highly in that direction. However, that is an individual expression of opinion. I gave it an extended clinical course of experimentation for five or six years, and I feel, as I have always felt, in regard to that condition that we can obtain better results in pyorrheal pockets and conditions of that kind by recourse to the simplest forms of surgical attention rather than the use of any form of therapy. That has been the consensus of the deductions I have personally drawn from its use in that respect. I simply divide its application into these two forms which have been advocated so much in pyorrhea, and I thought I would inject that bit of my own clinical experience in this respect.

Samuel E. Pond, Research Institute, Cleveland, Ohio.

As a student and teacher, I feel that Dr. Rhein's position is probably a starting point for us to use. In the laboratory we work with chemicals and conceive of ions moving in this and that direction but it is not necessary to speak alone of chemistry when we talk with men, whose work is with patients, for we are not limited to working with test tubes and with the galvanometer.

With regard to the general aspects of "Ionic medication" it may be said that, in the face of all the evidence which has appeared in the literature, from the experimental side, that is, from a quantitative point of view, the questions that were asked back in 1897 and 1900 are not yet clearly answered.

In the paper which was read by me this morning* only two of the main questions were answered, and I hope this point will be made clear. The discussion was not as to whether electrolytic medication was worth while or not, but in starting somewhere it was an attempt to answer the very definite question, namely, what is the effect upon bacteria of (a) electrolytes and (b) electric current? You will recognize that there are two ways of combating disease, one to kill the bacteria and one to change the conditions so that the bacteria cannot live. Now, if we have shown experimentally that certain ions or electric current under certain conditions will not kill bacteria directly, that is not a sufficient answer to all your questions, nor is it directly applicable to "electrolytic medication." Many considerations must yet be brought into the discussion of the subject.

Perhaps there is something else which may help here, if you look at the problem in the following way. At present it is not a problem in electricity, nor physical chemistry, nor mathematics, but of gaining the correct ideas about "electrolytic medication" in such a way that you have a tool which you can use. If we talk about ions or colloids without explanation it is going to be very hard for you to understand at first. It may be "like Greek" to some of you, but it is up to you all to help simplify such expressions for the time being until we laboratory men change or explain our wording.

Studies in physical chemistry which have led up to the discussion of our subject by Dr. Fette, have changed research methods in medicine in the last five years and to keep up with the tide and with such changes is quite a proposition. Every man who is now using "electrolytic medication" should, on the one hand, be up with the chemistry he learned twenty-five or five years ago and, on the other hand, connect with the theories of today. This is a tremendous job. I only wish it were possible for the dentists to have in their laboratories some men who are in touch with both the strictly medical and physical and perhaps the physiological questions of the day.

In regard to one question which has been brought up in the discussion, that

*"Electrolytic Medication—Physiological and Dental Aspects."—W. A. Price and S. E. Pond, Research Institute Report.

regarding colloids, I think it exceedingly important to have pointed out, namely, that the human body is not made up of suspensoid but emulsoid colloids in a large degree. We recognize, today, two colloidal conditions in respect to ions and electrolytes. "Suspensoid colloids" means one condition of solution and "emulsoid colloids," another. If you take either type of colloidal solution and try to precipitate the suspended particles you will find that small quantities of ions do not bring about the change. Fischer in his English translation of a book on colloid chemistry* brings out the fact that to change the equilibrium of a colloidal solution, you must have the precipitating amount of reagent there all at once; that, adding substances, such as ammonium sulphate, hydrochloric acid, or an antagonistic colloidal solution (opposite electrical charge) will not precipitate the particles unless the reagent is present in bulk. You must have the reagent there in sufficient quantities, and these quantities are determined largely by experiment. It is doubtful if we can get ions of any character thru a tooth wall or apex in sufficient quantity to precipitate colloids or even suspended particles, as edematous tissue fluids or pus. It may be perfectly true that we can do it, but what is going to become of the precipitate and what effect has that precipitate upon the local condition? These are questions we can not now answer. It may take years to decide them. It will take weeks and months of individual laboratory experiments of one kind or another to clear up any such problem of this field. I wish to have you look on the whole subject in this way.

There is evidence accumulating today that one thing or another is, or is not, true about "electrolytic medication." So far as you are concerned it does not matter whether we call the basic particles ions, electrons, molecules or atoms. It is important to state that we do not at present regard the human body as an ordinary chemical system; it is a dynamic system where structure and function are inseparably related. You cannot, for example, destroy function with destroying structure, and vice versa. This is not a purely chemical question. So in "electrolytic medication" you will need to supply clinical as well as chemical evidence and study it the best you can, then get in touch with men connected with institutions like the Rockefeller Institute and students who are taking up the physical and chemical aspects of vital phenomena. As far as you can make your results comparable with the results of the laboratory, or show the laboratory men that they need to change their terminology and interpret their results so you can understand them. In other words, the best way to readily interpret vital phenomena and solve these problems is thru closer cooperation.

L. E. Custer, Dayton, Ohio.

This paper is a most timely one, and I shall not attempt any criticism of it, for that would be presumptuous on my part, but I shall rather add to it, bringing out more particularly its application to the one subject which is most prominent before the dental profession today, that is, the perfect sterilization of pulpless teeth and the rendering of them immune to any future focal infection, and the role that ionization plays in the same.

It is interesting to note how near, several times in the past, this came to being accomplished. Dr. M. L. Rhein first blazed the way in 1897, but he did not go far enough. Some 20 years later Dr. Herman Prinz goes over the same trail backing new findings here and there, but he, too, does not go far enough; and now comes Professor Fette over the same trail and at the very end of it

*"Handbook of Colloid Chemistry."—Ostwald-Fischer.

when even within sight of the goal he, too, gets lost in the underbrush.

What I have to offer is a new thought upon root canal work. It is a further step along the work already done by Rhein, Sturridge, Prinz and Fette. It is based upon the sterilizing property of the electric current than which, when properly applied, there is no more certain and far reaching agent. Its most fitting application, as it seems to me, is in connection with root canal work, and it could have come in at no more opportune time than just now when both the medical and dental profession are "up in the air" as to what we shall do with the pulpless tooth.

The work which I have done is so closely related to Dr. Fette's work that I shall here give only the skeleton of a paper which is soon to appear. The scheme, in short, is this: Fill the pulp canal with oxychloride of zinc which has been made a conductor of electricity by the addition of precipitated metallic zinc and into the body of this, while yet soft, thrust a long metallic zinc cone which reaches the end of the root and which is to be left there forever. That is the point. Fill the root canal with a zinc cone and leave it there forever. We thus have, at all times, the inhibitory effect of the zinc filling (but of which Prinz is doubtful), and in the event of future bacterial congress in the apical region, we have a fixed electrode for electro-sterilization or, as we now term it, ionic-sterilization.

The zinc cone for this purpose is made about two inches long from a zinc wire. This serves as a handle which gives a much more delicate sense of touch than is ever possible with a limber gutta percha cone. Contrary to Professor Prinz, (who claims zinc is too brittle) I find when this metal has been drawn into a wire thru a draw plate, it is endowed with an ideal stiffness and pliability for this work. It is far from brittle.

The procedure somewhat in detail is as follows: having employed the usual mechanical means for cleansing the pulp canal, in a sterile glass place four or five drops of alcohol or preferably Dakin's solution, a drop of saturated salt solution, and two or three crystals of cocaine. The alcohol is for a sterilizing and drying effect; the chloride of sodium is to make the alcohol an electrical conductor, and incidentally it liberates nascent chlorine in the pulp canal, and the cocaine, altho not absolutely necessary, is to anesthetize the periapical region. With a minim dropper fill the pulp canal with the foregoing solution. Connect the zinc cone with the positive of a cataphoric appliance and the sponge to the negative. Insert the zinc cone only half way in the pulp canal at first, for electrolytic bubbles will defeat the scheme if they are formed too near the apex. Electrolysis is at work at the needle, while cataphoresis is at work carrying some of the solution thru the apical foramen. Follow the solution until the ammeter returns to zero or thereabouts. This indicates that part of the alcoholic cocain has passed into the apical region, and the other part in the pulp canal has passed into a gaseous form, and thus in a single act we have anesthetized the apical region, for otherwise ionization would be somewhat painful if a heavy current is used and in a most effective manner we have sterilized and dried the root canal.

Now mix the cement and work it into the pulp canal, using the zinc cone for this purpose, then finally force the cone to the end and leave it stay there. Now ionize the apical region for the constant of thirty as laid down by Prinz. That is, the milliamperes multiplied by the time in minutes should equal thirty to perfectly sterilize.

Cut off the zinc wire flush with the cavity, leaving the cone in the pulp canal. We have thus not only filled the pulp canal aseptically, but we have sterilized the apical region and prepared the root canal for future resterilization, if

necessary. In case of subsequent germ foci, instead of removing any root filling, it then only becomes necessary to expose the zinc cone and ionize. If a metal filling is used around the zinc cone, it need not be exposed, simply hold the positive electrode on the filling.

Now, by this process we have also sterilized the dentin to a certain depth, the oxychlorid being a conductor.

It has been said that it is impossible to absolutely sterilize infected dentin in its entirety. That being so, we have done the next best thing. The live bacteria cannot get out thru the cementum, and they cannot back out into the pulp canal for they will run into the deadly zinc chloride. So there you are.

The foregoing outline will soon appear in an unabridged paper which will go into all the minute details. And I repeat again that Dr. Fette has brought ionization before the dental profession in a crisis in which it is most timely.

George T. Fette (closing discussion): Replying to Dr. Rhein's request with regard to terminology and the distinction between ionization, electrolyzation, electrolytic and so forth, it is well to bear in mind that ionization is had prior to any application. If we put a piece of common table salt in water it becomes dissolved. The molecules break up; half of the particles becoming positively charged and the other half negatively charged. In that condition they are in shape to conduct the current. The phenomenon of breaking up into particles is ionization; therefore, when we speak of ionization, we only mean that phase of our work in which a solid substance goes into solution. There it ends. If we apply the electric current these particles having been previously formed, lose their respective charges by neutralization with the positive and the minus poles of the electrodes. The instant the electric current is turned on, the positive phase of electricity passes one way, and the negative phase, the other way, giving us migration or movement of ions which in turn, when they reach the electrode become neutralized. The ionic condition is thus given up and the particles are liberated as free elements, and this is known as electrolysis. In common table salt, the sodium ion, will move towards the negative electrode, when it reaches the electrode its charge becomes neutralized and you have free-sodium. The chlorin ions will travel towards the anode and when they reach the anode they become elementary chlorin. This phenomenon of the breaking up of a salt, as we said, is known as electrolysis. All we want in electrolytic medication is to carry a certain ion into the tissues at certain depths where we expect the germs to be lodged and there let the ion to exercise its pharmacologic effect. Now the combined phenomena of conducting the current (or migration) and liberation of ions (or electrolysis) was called by Farraday an electrolytic process. Hence we should employ the term "electrolytic." Ionic medication is a chemical process. When we pour two substances together, like silver nitrate and hydrochloric acid, chemical takes place not between the two substances but between their ions and we have ionic reaction, whence the term "ionization." We often use this word ionization as if it were a verb in the active meaning, that is, to put tissues into shape of ions. It is wrong to say that we ionize the tissues, when we mean that we affect or treat them with ions. You might correctly say that we *"electrolytify"* or *"ionify"* the tissue. It is also not proper to say that we electrolyze the tissues. For to electrolyze a tissue would mean to decompose it by the electric current. The best word to employ in all the above cases would be "electrolytic."

As to the question of Dr. Rhein of what becomes of the zinc that is dissolved, I would say that it passes into the ionic condition just as in a battery where the zinc finally disappears, and

the ions are carried into the tissue, and finally, form zinc protein or colloid zinc albuminate. This is another proof that we can have ionic reaction in the absence of a secondary chemical by-product like, when we treat albumen with a chloride we get that secondary product, hydrochloric acid. This is an irritant which we should avoid. We have an awful horror of using acids in treatment, yet I must say here that I have had pus conditions which I could absolutely not control. I used 25% sulphuric acid applied with the positive electrode and passed the hydrogen ion right into the apical area of a root with perfect results. There was no more pus months after that and the tissues healed up nicely. Why can we use the sulphuric acid in electrolytic medication? Because the hydrogen of the acid is carried in with the positive phase and the sulphuric acid radical, (SO_4) is carried away from the site of medication, so that virtually we apply no acid at all, i. e., in its molecular state. Sometimes when I electrolytify with zinc chloride I add a few drops of acid to help it along with the hydrogen ion which travels five times deeper in the tissue.

I appreciate Dr. Rhein's faith in this treatment as far as abscessed conditions are concerned, and I would like to give him some encouragement in regard to the treatment of pyorrhea alveolaris.

In treating pyorrheal conditions I use the pure copper electrode without any liquid. The copper electrode will give up the copper ions. I get the point to a fine condition and insert it down into the pockets and run the current until the tissues all around become colored blue. I can see the depth of my electrolytic treatment. Those teeth will tighten up even when there was an inflammatory condition present. Even when a tooth is ripe and ready for extraction and the patient is suffering much from inflammatory condition, you can electrolytify the tooth for four minutes with iodine and send the patient home. At the next sitting when all the inflammation is gone, and if I think it is proper, I extract the tooth and the patient will appreciate the procedure. Removing the tartar I do that after the first or second treatment because the tissues will have shrunk sufficiently in the meantime to expose the carious material.

With regard to the remarks made by Dr. Pond, I will say they are very appropriate. We never aim to destroy bacteria by the electric current. That is farthest from our minds. Our treatment is really a chemical one. All we aim to do is to carry medicaments and let the ions do the chemical work afterwards. Nor has physical chemistry much to do with ionic medication. Our experience must come largely from pharmacology, but the more we know of physical chemistry, the better are we qualified to conduct electrolytic medication as to technic. We can not know too much about physical chemistry.

With reference to the precipitation of colloids, which was referred to by Dr. Pond, we have no suspensoids in the body. If we had simple suspensoids, precipitation would be more simple. Being emulsoids, these particles are covered over with protective colloids and as a result we need more ions to precipitate them, and we need these ions all in a bunch, as Dr. Pond has said.

Q. How long a time should we apply the electric current?

Dr. Fette: We have a rule formulated by Dr. Prinz, published in the April issue of the Dental Cosmos, which gives us a certain constant. We must attain that constant if we want disinfection. This constant is 30. That means, if you can get one milliampere of current flowing constantly for 30 minutes you have a dose for one treatment, or if you can get two milliamperes for 15 minutes it would mean the same. Three milliamperes is about the maximum. I

hardly go above two when I pass the current thru the apex of a tooth. We may pass two milliamperes of current for 15 minutes independent of the area of the electrodes in the tooth. In using surface electrodes we allow two milliamperes per square centimeter.

Q. Do you use zinc chlorid or sodium chlorid?

Dr. Fette. I use zinc chlorid.

Q. What per cent?

Dr. Fette. The percentage is quite an immaterial factor. Ions introduced are proportional to the chemical equivalents. If the equivalents are not there, you will not pass the current. I like to take about two per cent, but as far as the electrolytic action is concerned, it makes no material difference what the strength is.

Q. Is the result the same if you use pure zinc in the sodium chlorid solution, or do you get a different result?

Dr. Fette. If you take a mixture of sodium chlorid in pure zinc, you send in all sodium ions, and when they become exhausted you send in the zinc ions. That depends upon the decomposition—voltage of the respective salts.

Dr. Ottolengui: If you are using a current with a reading of one milliampere, with the positive electrode in the tooth and the negative electrode (at the wrist?) the reading would be decreased, would it not?

Dr. Fette: Electrical energy depends upon two factors, current and the voltage. The resistance is only the regulator. The resistance determines the amount of current that flows. Of course the greater the resistance of the patient the greater must be the voltage, but once we have one milliampere of current flowing, whether you have a thousand ohms of resistance or ten thousand, it does not matter: you are conveying so much electricity and the amount depends upon the number of ions that are carried in. Therefore, it is immaterial what the concentration is, whether one per cent or ten per cent., one milliampere will carry in a definite amount of ions.

Dr. Ottolengui: We are trying to establish a definite voltage, and you say we must have one milliampere of current for 30 minutes.

Dr. Fette: You are giving the same electrical energy as long as you pass what the milliampere meter tells you. We go by the current but the voltage will depend upon the resistance of the patient.

WHAT WOMEN DENTISTS ARE DOING IN THE PRESENT CRISIS.

By DeLan Kinney, Chairman Sub-Committee on Dental Service, War Service Committee Medical Women's National Association.

(Read before the National Dental Association at Its Twenty-First Annual Session, New York City, N. Y., October 23-26, 1917.)

FIRST I wish to express appreciation to Dr. Beach for his recognition of the splendid work done by American women dentists in the appointment of a representative in the Preparedness League, and to thank him for the honor which I deeply feel in being appointed the representative of that body. It is my happiness to serve them and the Preparedness League to the fullest of my ability.

The cry of humanity crushed by the cannon in the great World War has been heard and answered by not only the men of America, but by the women as well. Even before America had entered the conflict, American women had become of great importance to the Nation and to the Nations, and as much as they have already done, they are intently eager to do more. To fail to do one's part in this era is not to have existed in it.

American professional women have not only the joy of trained minds and skillful hands, but the opportunity to serve greater than has ever before been known.

Personally, I desired to enter active service in the Officers' Reserve Corps, and after all my diplomas and papers having been passed by the Surgeon General's office, and having been duly notified that I was eligible for the Dental Corps, I hastened to Washington requesting my early appointment and interviewed Major Noble. In my interview with Major Noble he stated that regardless of ability and eligibility, the law did not provide for the commissioning of women, and nothing short of an Act of Congress would admit women. However, he advised that since I wished to do my part in war work, that I could best accomplish it by joining the American Women's Hospitals, for they were doing fine work. As I had already been requested by Dr. Rosalie Slaughter Morton, who had herself seen active service in Siberia, that I take charge of the Dental Service of the A. W. H., I returned to New York and upon Major Noble's advice, accepted the Chairmanship, after fully acquainting myself with the aims and plans of that splendid organization.

I now fully agree with Major Noble and recommend that any woman who wishes to do her war service can find no better way or opportunity under existing conditions than with this highly proficient organization of professional women.

To better tell the scope of the work of the American woman dentist, it is first necessary for me to briefly outline the plans and organization and work already accomplished by the American Women's Hospitals, thru which the vast amount of dental work obtained for the draft soldiers has been accomplished for the Preparedness League of American Dentists, whose work it has been to equip the men for the new National Army. It is very gratifying to know that Dr.

Charles Ash, President of the First District Dental Society, had stated that some of the best work done for the League had been done by women.

The A. W. H. is an organization of Medical women in this country which is formed a part of the War Service Committee of the Medical Women's National Association.

1. The work is divided into maternity units to devastated parts of Allies' countries.

2. Village practice in Allies' countries.

3. Women's Hospital Units to the United States Army in Europe.

The maternity unit is a work that is needed as much as any other. In Serbia especially they need the help of the woman physician. All the men have gone, even men of 72 years old being in the army.

The work to be done by the American Women's Hospital Unit of the United States Army is to be of the highest type of service. Already a hospital equipment for an Army General Hospital has been accepted by the Surgeon-General's office, to be established in New York. The staff is to be selected here in New York. We expect to have Hospital Units go over to work for the Allied Armies. The Red Cross already has units over there and 11 of our women have sailed. We have already organized one convalescent hospital in Boston. In North Carolina there is a tuberculosis hospital under the care of Dr. Mary Lathrop, one of the foremost of American women physicians. The fact that most of the boys come back, or have done so far, have been tuberculosis, and not wounded, shows that that part of the work is a very important one and one that will very quickly be needed for service.

The card of the soldiers and their dependents will fall to the part of the American Women's Hospitals. The wives and relatives of the soldiers will be able to come to these hospitals for care or be treated by the physicians and will not need to go thru the ordeal of waiting in the regular clinic routine. We have also women who speak German, who are true citizens, and who will attend to the prisoners of war held in camps and also the interned aliens.

The Medical Service will include sanitation, medical instruction, bacteriology, and in connection with the latter there are to be women trained in laboratory technic, who are not physicians, but who can be employed by the Government to do routine bacteriological work. This is one of the first needs to be filled. The Women's Hospitals have organized courses of extensive work, so that the women who are not physicians can do the analysis work in laboratory war work. The training of anesthetists is another branch which will be of great service.

Women can go into this work as contract physicians and later on it is understood that they can apply for regular commissions, tho at present the regulations do not permit of this. Then there is the line of work in which women can take substitute practice for the private practitioner. Here there is a special need for loyal service on the part of the substitute who is to turn the patients back to the physician when he resumes his practice.

Hitherto it has been very hard for women to get into the hospitals as internes, but recently one hospital called on us for ten women to serve as internes, so that if the Government will not let us go to the front, we are certainly doing our work here.

As American Dentists we have been called upon to cooperate with the American League of Preparedness. In New York 13 women workers have covered the work of 182 fillings, 54 extractions and 34 cleanings, which is by no means a complete record of the work done. Many of the boys have been turned over to the Dental Hygienists to have their teeth cleaned and the girls have been

working long after office hours in order to do this branch of the work. At the Academy of Medicine there have been 605 extractions, after treatments 107, 7 surgical operations. Of 3000 operations performed in Manhattan 659 were done by women operators. The women have worked after hours and have often made reappointments so that it may be said that the women have given the best type of work of which they were capable.

We have organized the services of any women who are willing to help us and we have them state the day and hour they can help and what work they would like to do. A woman 74 years old wrote in answer to questions that "her health was pretty good considering her age." Naturally that answer made one curious to see what lay behind it. Upon inquiry we found out that the woman was 74 years old, and her husband had been in the Civil war and she had helped then, later she had helped in the Spanish American war and now she was willing to do her bit to help in this war. She must be a pretty fine sort of woman to be willing to do her bit at her age. I wish to ask anyone who can to join us and give what help they can to the American Women's Hospitals.

I don't think that professional work should be divided up into men's work and women's work. There should be no distinctions made if they are willing to do war work. The war calls for the service of women as well as men. We are getting calls for women physicians and women dentists. One woman has sailed who is only 22 years old. When she was going, a woman stopped her and asked her, "What are you going to do, you look a mere child." She said, "I am young, but I am going to do my bit."

Dr. Beach has asked the American women dentists to keep a separate record of their work so that we can see what they accomplish.

THE ECONOMIC VALUE OF THE INDUSTRIAL DENTAL CLINIC.

By T. P. Hyatt, Dental Director Metropolitan Life Insurance Co.

(Read before the National Dental Association at Its Twenty-First Annual Session, New York City, N. Y., October 23-26, 1917.)

IN DISCUSSING the economic value of Industrial Dental Clinics, it is important to consider what information and facts are desirable to secure and which will be of value to those who have charge of the welfare of employes. It would be impracticable as well as prohibitive in cost to attempt to work out a plan of securing figures showing the amount of work turned out by an employe before and after dental attention. The problem of proving the value of dental clinics in the industries from the standpoint of the employer, must be approached and demonstrated from a different viewpoint.

It must be conceded by all that a sick man, no matter what his ailment may be, is not as efficient a worker as one who has good health; nor is he a desirable person to have working in the same room among a number of other workers. Further, he becomes a risk to the employer because of the possibility

and probability of accidents, either to himself or to his fellow workers.

In establishing a dental clinic for the Metropolitan Life Insurance Company, these objects have always been held in view, viz. first, the giving of relief to pain, and affording an opportunity for any employe to receive a thoro prophylactic treatment. Second, to give every employe instruction in the care of his mouth and teeth and establish an educational campaign so he may appreciate the importance of the mouth in its relation to health. Third, to endeavor to secure reliable statistical information in regard to the relationship between dental infection and systemic disturbances.

The adoption of a chart which would provide for the recording of dental and physical condition was the first step.

Thru the hearty co-operation and interest of the Medical and Statistical Departments, we have, I believe, secured figures which will prove of interest. It must be remembered, however, that this is only the beginning. We are carefully following up these figures, re-examining patients, working over selected groups of cases, and are now making a special study of blood examinations. The figures to be presented today are from a class of two thousand patients. A mouth examination was first made and the findings recorded. All teeth which were crowned, and those having devital pulps or what is commonly called dead nerves, were radiographed. From the medical department was secured and recorded the physical condition. From the Rest Room was secured information in regard to illnesses. These charts were then sent to the statistical department, and specially printed cards were then punched. These punched cards were run thru tabulating machines and the results carefully studied.

The information obtained is interesting, and, I believe, important.

This group of two thousand cases was divided into two classes. First, those who were not radiographed, because they did not have any crowned teeth, and a casual examination had not shown any teeth with dead pulps, second, those who were radiographed because there were crowned teeth, or teeth which were known to have devital pulps. A more careful examination of the non-radiographed class may show infection caused by impacted teeth, and by testing with electricity or thermal changes of heat and cold we may find unsuspected teeth having devital pulps. For this reason a further study is now being made of the non-radiographed class. It should be realized, however, that no matter what the findings of this extended study may be, it can only increase the percentage of the figures we shall present this afternoon.

The class of those that were radiographed has been divided into two subheads—those showing infection at root ends, and those showing infection having progressed so far as to be considered a blind abscess. The systemic ailments which have been found to be largely increased among those having dental infection are neuralgia, neuritis, headaches, nervousness, colds, furuncles and skin trouble, any one or more of which are bound to impair the efficiency of any employe.

We find neuralgia and neuritis show an increase of over 10% among those having dental infection at root ends as compared with those not radiographed.

Colds show an increase of over 16%.

Headaches show an increase of over 52%.

Skin troubles show an increase of over 53%.

Furuncles show an increase of over 58%.

Nervous troubles show an increase of over 117%.

Patients having blind abscesses show a still larger increase—of these condi-

tions neuralgia and neuritis are increased by 18%. Colds are increased by 19%.

Headaches are increased by 68%.

Skin troubles are increased by 73%.

Furuncles are increased by 87%.

Nervous troubles are increased by 164%.

A study of these two tables show that when patients do not attend to these dental infections but allow them to progress and develop until an abscessed condition is brought about, we find that neuralgia and neuritis is increased by 75%, colds 15%, headaches 30%, skin troubles 35%, furuncles 50%, and nervous troubles 40%. The urine analysis showed a decided increase in albumin in both classes of infection and blind abscess while the only casts found in the two thousand cases were all in the class of blind abscess.

It is evident from these figures that any welfare work to be of value must include dental service, or arrangements must be made whereby proper dental attention can be secured by the workers. In the establishing of a dental clinic, several facts should be clearly understood, and provision made for their adoption.

No improvement in the health of an employe can be expected even when all dental cavities are filled and all missing teeth replaced by artificial work, if infection or blind abscesses are present and allowed to remain. In the mastication of food a pressure of from 200 to 400 pounds per square inch is brought upon the teeth and this helps to force infected matter from blind abscesses into the blood stream and thus it is conveyed to all parts of the body. As infected area around root ends, imperfectly filled roots, blind abscess, and impacted teeth, can only be ascertained by the use of the radiograph, every industrial dental clinic must be equipped with a dental radiographic outfit. You might just as well expect a dentist to be able to prepare and fill cavities in teeth without a dental chair, dental engine and instruments, as to expect to gain any permanent benefit to the health of your employes without a radiographic examination of the teeth.

Co-operation between companies employing dentists should be encouraged by the officers of those companies, so that uniformity of record charts and system of recording can be adopted. This will greatly help in the securing of valuable data.

The Metropolitan Life Insurance Company established their dental clinic in July, 1915. Since that time employes have received ——— prophylactic treatments and examinations. Over ——— radiographs have been taken showing ———infection and——— blind abscess among——— persons. We thus see that ——— % of those examined have dental infection or blind abscess. Our efforts now are being directed to the treatment and removal of the infected area and abscessed condition. A blood count is being made before and after treatments, and all other information in regard to changes in physical condition are being recorded and carefully studied. We have not, up to the present time, secured enough data to be able to give the percentage of improvements or the kind and quality of improvement, but the outlook is both promising and encouraging.

In closing allow me to say that the Metropolitan Life Insurance Company will gladly co-operate in any and every way with all companies interested in this subject so that more knowledge and greater good can be secured for all employes.

GRADUATE COURSES IN DENTISTRY.

PRESIDENT'S ADDRESS.

By J. F. Biddle, D. D. S., Dental School University of Pittsburgh.

(Read before American Institute of Dental Teachers, Pittsburgh.)

WHILE considering the subject of the President's address, the speaker recalled a statement that was made at a previous meeting of this Institute to the effect "that in one city alone, thirty malpractice suits were pending against as many members of the dental profession, as the result of the teachings of certain well-intentioned radical men who had given so-called post-graduate courses in dentistry." This statement influenced materially my decision to make, not only Post-Graduate Courses in Dentistry, but Graduate Courses as well, the subject of this address.

It is the belief of the writer that one of the greatest needs in the dental profession today is to extend the work of the colleges beyond their four years' curricula so that they will adequately meet the needs of the large and constantly increasing number of progressive dental practitioners who are earnestly striving to satisfy the demands of their profession for highly skilled and intelligent dental service.

Scientific research investigations within the past few years, with their corresponding acquisition of knowledge, have so enlarged the scope of dentistry that many of its methods of practice have been completely revolutionized, thus making necessary a pronounced amplification of dental courses. This condition renders it important that the schools provide adequate post-graduate courses for men who have been in practice for a number of years; and suitable graduate work for the recent graduate who is desirous of carrying his professional study further than the regular curriculum.

The speaker believes that an admirable way to develop this field with a desirable uniformity, and to secure its early adoption, would be to have the faculties represented in this Institute decide upon the character of the work most needed.

To carry out this plan and to provide for a graduate faculty, present faculties, no doubt, will have to be enlarged by the addition of outside talent, either sion. There are many men, not mempermanently, or specially, for the occaunder the supervision and control of the organized teaching bodies of the profession. There are many men, not members of school faculties, who would be available for this work, and whose connection with the graduate faculty and the resources of a school, would prove advantageous to them, to the school, and to the work. This plan would do much also, to eliminate the unqualified teachers of post-graduate courses.

The writer has endeavored to obtain the consensus of opinion of representative dentists upon the question of post-

graduate and graduate courses, to which end questionnaires were addressed to the forty-nine presidents of State societies, the secretaries of all State Boards, and the deans of all the colleges of the Institute.

We shall consider first replies received from men not connected with, nor materially interested in the Institute, namely the presidents of State societies, and the secretaries of State Boards, from whom replies were received as follows:

1. Are you in favor of Dental Post-Graduate Courses for practitioners? Fifty-two answered "Yes."

2. Are you in favor of independent Post-Graduate Courses conducted by individual dentists forming classes for their individual profit? Twelve voted "Yes;" 39 "No;" and 1, no answer.

3. Are you in favor of Dental Schools giving extension Post-Graduate Courses to dental practitioners? Fifty-one votes "Yes;" 1, "Not sufficiently posted to make any reply."

This data is significant: It is indicative of the fact that altho 100% are in favor of post-graduate courses in dentistry, less than 25% are in favor of having such courses conducted by individuals. It is evident, therefore, that post-graduate courses are in demand, and if this be the case, our schools should devise some plan to provide them.

Of forty-six schools holding membership in this Institute, only eight are offering post-graduate work, altho to judge by replies of the deans, every school is in favor of same. It appears, then, that the majority of our schools assume that their responsibility to the student is terminated with his graduation. In reality, this is the beginning of his education,—his initiation into the practical. This is the time of all others in his life he would appreciate most a correspondence, or information bureau, where he might write or call in person, present models, or data regarding cases in practice, and be advised as to their best mode of treatment. In addition to this feature, each school should have its own pathological laboratory, where specimens, swabs, etc., could be sent in for examination and diagnosis. This department should be open to every dentist within the school's jurisdiction, who wishes to avail himself of its use. A small fee, sufficient to cover expenses of operation, could be charged. Office technic for the dentist should be included, in order that this work could be carried on by a definite plan thruout. Such a department would furnish a great deal of clinical material for use by the schools; be of great service to the dentist, and give him practically all the advantages of his own pathological laboratory, which the average dentist has neither time nor money to develop.

In order to encourage the better type of student to take up graduate work and to develop real value in it, one year, at least, should be required, and a graduate or advanced degree, such as, Doctor of Dental Science, for instance, should be given. This does not mean that a dentist be required to retire from his practice for one year to pursue graduate work, unless he so elects, but that the course be arranged to suit his convenience, thru one year or a number of years, day or evening, to cover the prescribed course of study on required or elective subjects, to entitle one to advanced degree, at least one half number of credits required for degree, to be acquired in resident work in Institution. For instance, much of this work might be done by night courses at the school, or extension courses in other cities, if sufficient demand be developed therefor. As required work upon each subject is completed, grade cards containing record of credits might be issued. Thus the work could be continued from time to time, until the aggregate courses totaled sufficient credits to entitle the student

to advanced degree. In this way, one or a half dozen courses might be taken, regardless of credit for same, individual advancement being paramount, credits, secondary.

The following is offered as a tentative schedule for Graduate Courses:

	Subjects	Lectures	Demonstrations	Laboratory
1.	Dental Pathology.	20 hrs.	10	10
2.	Radiology	10		4
3.	Anesthetics	15	15	
4.	Minor Surgery	20	10	20
5.	Oral Hygiene	5	5	
6.	Bacteriology	20		60
7.	Pathology	20		60
8.	Dental Histology..	15		60
9.	Operative Dentistry	10		20
10.	Prosthetic Dentistry	10		30
11.	Crown and Bridge Work	10		30

Thesis—An original article on some problem of dentistry requiring study and investigation to be submitted by each candidate for degree.

The exact number of hours devoted to each subject in lectures, clinics and laboratory with credits for same, should be determined after course has been outlined in detail by various teachers of these subjects. To be of most value, such a course should include both the practical and scientific phases of dentistry. For after all, the acquisition of knowledge, unless it be accompanied by the skill to apply it, availeth little; and in dentistry this power consists largely in one's ability to correlate the practical, scientific and theoretical parts of his education, that it may prove of greatest service to the human race.

Graduate Degrees under consideration by various schools of Institute:

1. Doctor of Dental Science—One year's work, at least, required.

2. Master of Dental Science—One year.

3. Bachelor's Degree for four years' course in dentistry; Master's Degree at end of fifth year; Doctor's Degree, within one or two years thereafter.

Thus far, one school, only, is offering a graduate course and conferring a degree, but as correspondence with deans who have thought sufficiently upon the subject to express an opinion upon it, indicates there is a widely different idea as to the degrees to be conferred, it would seem to be indicated that some uniformity is necessary. Otherwise, we shall have a half dozen kinds of degrees in as many institutions, which in reality, are conferred for identical courses. Now is the time to adjust this matter before many graduate courses are inaugurated, or many such degrees conferred.

Courses in War Dentistry.

Not every school in our membership may be equipped to offer graduate courses to graduates and practitioners, but, in the present world crisis, it is the duty of every dental school in the United States and Canada to establish courses in War Dentistry.

Such courses might profitably be divided into four parts:

a. Anatomy: Lectures and dissections of head and neck.

b. First Aid Work:
   Bandaging of wounds.
   Reduction of fractures.
   Assuming general direction of patient until arrival of medcal aid.

c. Infections and Inflammations.

d. Study of Equipment of Army Dentists and Operations Required of Same.

A committee should be appointed to collect all necessary data, outline courses, and distribute such information to respective members. Such courses to be offered upon recommendation of American Institute of Dental Teachers, and to consist of day or evening classes as occasion demands, to teach dentists within their jurisdiction first aid work, as well as the essential features of governmental requirements. These courses

would in no sense cover the work required of men who take up head surgery, which of necessity must be covered in special courses and which every school is not equipped to give. No one can tell how long this war may continue, or how many of our men may be called to the service, hence we should equip ourselves to the fullest degree of efficiency, fitted to do our part in any emergency, rather than to enter the service untrained and unskilled in such particulars, and be compelled to waste valuable time in the acquisition of rudimentary essentials. Upon receipt of plan outlined for this work, it is suggested, that schools adopt it promptly, thereby encouraging this movement.

Briefly stated, the matters upon which the Institute's action is respectfully urged are as follows:

1. Systematic graduate and post-graduate courses should be established, and to this end a committee should be appointed to work out a detailed plan for their operation, to be submitted to this Institute at its next meeting.

2. Courses in war dentistry should be inaugurated in all our colleges, and to this end a committee should be appointed to work out details and submit them to deans of all Institute colleges, suggesting their immediate inauguration.

This occasion commemorates the twenty-fifth anniversary of the founding of the American Institute of Dental Teachers. At the time of its inception, dentistry had made no organized or scientific advancement other than what had been accomplished by a few men, who by close application of mechanical and scientific principles had succeeded in evolving methods far in advance of their times, but which were designed more for the benefit of the particular operator and his following, rather than for the profession as a whole.

However, with the organization of this Institute, whose avowed purpose was the systematic teaching of operative technics in dental schools, the teaching of dentistry has been elevated to a higher plane, there has been a wider dissemination of knowledge, additional inspiration to study and research work, until now dentistry has come into deserved recognition on account of its high standards and its importance as a branch of the healing art. The greater enthusiasm for this work, its higher ideals, incentives to new and better methods, developed, in large measure, by the work of this Institute, and by the men, who have contributed to and controlled its destinies, has reflected a corresponding influence upon our student body, and each year we are graduating a better equipped class of students, to cope with problems that will confront them in every day practice.

In conclusion, therefore, the speaker desires to pay tribute to the founders of this Institute, and the men who have succeeded them as officers of this organization, thru whose efforts this Institute has advanced to its present sphere of service, and has proved such an important factor in standardizing the teaching methods of our dental schools.

Note:—Upon unanimous vote of Institute a committee composed of the following men: Dr. A. E. Black, People's Gas Bldg., Chicago, Ill., Dr. Guy S. Millberry, San Francisco; Dr. A. E. Webster, Toronto; was appointed by the chair to formulate plans to carry out suggestions embodied in President's address. Readers that have any suggestions to offer along these lines are requested to communicate with any of the above mentioned committee.—Editor.

Discussion.

Ellison Hillyer, Brooklyn.

It has been my good fortune to have listened to the presidential addresses every year since 1899, with but two exceptions: One due to unavoidable absence and the other when I had the honor of addressing you from the chair and listening was not required.

A perusal of these several addresses would unquestionably corroborate what Dr. Biddle has said regarding the influence of the men who, for the quarter

century past, have guided the destinies of the Institute. No doubt the inception of the work of this body in 1893 by a small number of earnest workers was the result of natural processes. Prior to that time the development of the profession was erratic and spasmodic and, in some ways, detrimental rather than beneficial in character. The Institute's beginning marked the passing of the two-year curriculum, with its indefinite methods and standards, to the three-year course, which demanded more specific and definite lines of teaching. Influenced by the somewhat chaotic state then existing, such men as Dr. G. V. Black, of sacred memory, Drs. Cattell and Morgan, whom we trust may be spared to us for many more years of activity, and "dear old Tom Weeks," whose migrations have carried him to southern climes,—all these men realized the necessity of some organization to bring about some measure of order. Their efforts with those of several others made the work of the National Institute of Dental Technics what it was for the first few years of its existence. Hardly had its technic teachings been fairly established before it was realized that its scope was limited by the needs of the enlarged curricula. The change to the "National Institute of Dental Pedagogics" made it possible to broaden materially the range of its operations, and, in all probability, no change would have been deemed necessary in name except that it became necessary to explain to many just what the Institute name really stood for. Then, too, we were more than a national body. With our four confreres across the border we were in reality "international," and hence the appropriate change to the present name of American Institute of Dental Teachers.

It may seem that I am not discussing the President's address but indulging in reminiscence. It is not usual to discuss the last of an address first but I have digressed purposely in order to make apparent what passed thru my mind as I read this presidential communication. All these changes that have marked the quiet, forceful progress of this unassuming body have been leading us, who form the working force of the colleges, along definite lines of progress. As the colleges have progressed, the profession has advanced and your President is correct in his statement about the graduate of today. We are now entered upon the operation of the four-year course and still we feel that the tremendous scientific impetus which has been given the profession in the last few years will outstrip our efforts to adequately prepare the graduate for his career at the end of even this period.

This, added to the fact that this same progress has resulted in leaving behind the non-student graduate, and even the graduate who is desirous of keeping up and is depending upon his own efforts to do so, makes the President's plea for a definite post-graduate course a wise one. We cannot keep on adding years to our course. Rather, more earnest attention should be given to the rearrangement of the preliminary courses and greater co-operation should be sought with the various "powers that be" in obtaining for our future students these desired changes in their early training.

In analyzing the President's tentative schedule, it appears that he has included all the subjects desired except Orthodontia. Possibly he places this outside the proposed course and there are arguments *pro and con* such a plan. It is, however, a specific post-graduate dental subject. As I have to present this matter later in the session, I will not amplify upon it at this time.

Regarding the first eight subjects on the list, I am not in a position to question whether or not sufficient time has been allotted to properly meet the requirements. Nos. 9, 10 and 11 I feel should

have more time than has been allowed. Possibly, in the reference of the recommendation to a committee, we will be given a re-arrangement which will better subserve the needs of the general course. It is my impression that this work should be carried on by a definite post-graduate faculty whose efforts should be primarily devoted to the work. It will be necessary to make these courses more than evening courses unless much less time than is indicated is given, and it would appear that Dr. Biddle's estimate of 489 hours is a minimum rather than a maximum. In other words, in thirty-two weeks, ten hours a week would give a total of 320 hours, 15 hours a week 480 hours, 25 hours a week 800 hours, and 40 hours a week 1280 hours, if I am correct in the casual figuring I have done.

As to the degree: Most certainly we should unite at the outset upon a suitable one. Whether our State laws will aid or hamper us in our several localities remains to be seen.

The President's recommendation regarding the course in War Surgery needs no comment other than to say that we as colleges stand absolutely back of our governments and the boys who have gone and are going to the front. As individuals we simply ask, "What is desired?"—and the response will go forth, "Whatever is asked, be it easy or difficult, we will do if it is in our power." We are constantly making sacrifices and will continue to make them till the end, whatever and wherever that may be. As colleges it is our manifest duty to carry the plan forward to the best of our ability.

J. H. Kennerly, St. Louis.

After a careful reading of the President's address, I find myself to be so thoroly in sympathy with the ideas expressed by him that it seems to me that whatever I may say will simply be a reiteration of what the address contains.

It is impossible for me to conceive of one finding anything in the address to criticise. Certainly, we must all agree with him when he says that, "one of the greatest needs in the dental profession today is to extend the work of the colleges beyond their four years' curricula, so that they will adequately meet the needs of the large and constantly increasing number of progressive dental practitioners who are earnestly striving to satisfy the demands of their profession for highly skilled and intelligent dental service."

Scientific research, which he so highly recommends, seems to me to be absolutely indispensable to the future success of the dental profession. The present conditions met with, and which are so frequently brought to our attention by reference from the medical profession, emphasizes the absolute importance of making the dental curriculum more scientific. More time should be given in the dental school to the subjects of biology, pathology and bacteriology. This is emphasized, to my mind, by the frequent applications from men who have graduated some years ago who are now seeking post-graduate work in these particular subjects. While operative and prosthetic dentistry are, I think, adequately taught in all schools, the sciences above referred to, do not receive the attention, in some institutions, which they deserve. If it is impossible to give the time required for this work in the regular curriculum, then, certainly, post-graduate courses should be established whereby the work could be had by men who earnestly desire it.

I know of no body of men so amply qualified to outline a course of post-graduate instruction as can be found in this body, and heartily favor the recommendation that a Committee be appointed to formulate a course which can be adapted to all schools in this association, and report it for action at our next annual meeting. Just how this shall be done, in my estimation, should be left

to the Committee and not take up the time of this meeting in discussing the whys and wherefores of the proposition.

The questionnaire sent out by our President speaks for itself. It is 100 per cent in favor of giving post-graduate courses in the dental schools, and I am surprised that so many are in favor of post-graduate work being done by some individual whose primary motive in giving such work is the accumulation of dollars. If the independent post-graduate teacher's work is meritorious, certainly his work can be incorporated into the work of a regular educational institution and thereby lend greater efficiency to the work.

"Of forty-six schools holding membership in this institution, only eight are offering post-graduate work." Just why this is true might be interesting to ascertain. Some schools believe in conducting their post-graduate courses simultaneously with the regular course of instruction, or during the college year, while others feel that it is better to conduct a post-graduate course during the vacation period. To the latter class I claim allegiance, for I believe that having accepted a class of students we should allow no other influence to detract from our effort to give them the very best that lies within our power. So few institutions have sufficient full-time men for giving post-graduate work during vacation period, consequently, the matter is neglected. I hope, however, that some solution may be arrived at by the committee suggested by the President. The value of a pathological laboratory to the dental profession is inestimable. I believe that the dental profession would occupy a higher position in the United States army today if more attention were given to the strictly scientific part of the dental curriculum. Too much encouragement cannot be given to graduates to urge them to continue their studies after graduation.

For some time the faculties of Washington University Medical and Dental Schools have been discussing a plan whereby the dental student could receive the M. D. degree in less time than would ordinarily be required by taking the medical degree first and the dental degree following, which now, in our institution, would consume about seven years. If the medical profession would be a little more liberal in their demands and realize certain fundamental subjects necessary to the practice of dentistry as equivalent to certain others in the practice of medicine, a conclusion might be arrived at whereby such a course could be consummated in five years.

As to the curriculum for post-graduate courses, suggested by the President, I see no reason why it should not be adopted, provided the hours in each subject correspond with the hours demanded by the educational institution teaching the subject.

Concerning the course in war dentistry, and I speak from experience, having taken part in the teaching of three classes in the Officers School of Neurological, Plastic and Oral Surgery, established by order of the Surgeon General of the Army in Washington University Medical Schools in October, 1917, too much emphasis cannot be placed upon the lack of preparation by the dental profession for the handling of such cases as result from the terrible war now in progress in European countries, to which the American soldiers are going day by day and who will very soon be returning from the front with demands for the greatest skill that human ingenuity can devise. How frequently I have heard the men taking these courses say, "How I do wish that I had been taught more of this when I was a student." While it is sure that the work of the dentist in the field and base hospitals will be to a large extent, mechanical, yet the lack of the knowledge of the treatment of wounds will be a very great handicap to the dental surgeon. My suggestion in this

particular would be that, anticipating the time that we arrive at the fourth year in the four year course, upon which we have just started, that wherever possible instruction in war surgery, splint making., etc., be taken up, but upon arriving at the fourth year of the dental curriculum these subjects be made a large part of the course of instruction for that year. So, that it may not be said of us in the future, should the occasion ever arise, (God willing that it never shall), that we were not prepared. Hence, we should (to use the words of our President) equip ourselves to the fullest degree of efficiency, fitted to do our part in any emergency, rather than to enter the service untrained and unskilled in such particulars and be compelled to waste valuable time in the acquisition of rudimentary essentials.

Arthur D. Black, Chicago.

I will confine my remarks to the subject of post-graduate courses. We need courses especially for the recent graduate, altho others should be eligible for them. These should occupy the time of at least a full school year, and should lead to a degree upon the presentation of a thesis, as suggested in the President's address. Courses of this type should be given to prepare for special lines of service. Those who expect to practice orthodontia should remain for another year, after completing their regular school course, to take a special course in this subject. Those who expect to specialize in oral surgery, those who intend to devote themselves more especially to treatment of diseases of the soft tissues of the mouth, and possibly also those who intend to devote their time especially to prosthetic or to operative dentistry, should have a vear of extra training. My thought is that one's time should be very largely devoted to a particular line of study, which would include all closely related subjects. One taking a special course in orthodontia, for example, should devote a part of his time to a careful review of dental histology, and should make a special study of the nose and naso-pharynx, etc. One taking a graduating course in oral surgery should make a very thoro dissection of the head and neck, should have a special course in bacteriology, and a course in general surgery, which should include attendance at hospital clinics, etc.

This type of course is difficult for our schools to handle because the number taking a particular course would be few, and they would require many hours' attention from the head of the particular department. This means that the teachers of these special courses must be either full-time men, or at least half-time men. I do not see how these courses could be carried out properly on any other basis, and very few schools have full-time professors in those subjects in which there would be much demand for such courses.

There is a large demand for intensive courses for men in general practice. These courses should be so arranged that they will be convenient for practitioners living in the city in which the school is located, as well as for those who come from a distance. Practitioners living in the city in which the school is located would prefer to spend possibly three half-days a week in the school, and devote the remainder of their time to their practices while taking these courses. The schedule for such courses should extend over a period of a semester, or possibly one school year. Those men who come from a distance, closing their offices for the time, would prefer to cover the same ground in a shorter period by devoting their full time to the work. They should be able to cover in one month the same ground that the other group would in a semester. These two forms have been presented in the announcements which have been sent out in the post-graduate work of Columbia.

A school which is doing teaching of

this kind must develop a good research department, because it must be doing real work to advance our knowledge and many new things must be tried out and their value proven.

At Northwestern we have been giving post-graduate courses for a number of years, and I wish briefly to refer to some of our experiences. We have given a four-weeks' intensive course. Until last year this course was given immediately after the close of the school year; it was never quite satisfactory either to the classes or to us. There was the lack of animation, produced by a comparatively empty large institution. It was like a party of 25 or 30 couples in a ball room which would accommodate 250 couples; a chilly affair. Last year we gave our course in February, during the busy time of the school year, and it was so much better for both the post-graduates and for ourselves, that there really was no comparison. I appreciate what Dr. Kennerly has said about our duty in devoting our time to our students for their regular studies, but I believe that very few teachers are devoting so much of their time to their regular teaching that they cannot devote whatever time is necessary to the post-graduate work for a few weeks during the regular session. Not only does the post-graduate student have much more enthusiasm in his work, but there is an impression left with our own students; the thought is placed in their minds that perhaps some time they ought to return for post-graduate study. I believe the sowing of the seed of this thought is well worth while.

We have found difficulty in getting post-graduate classes to do much operating in connection with these courses. I think the principal reason is that we have not had a separate clinic-room for them. A man who has been in practice for several years, and who has become a little rusty, if I may call it that, as to some of the technical details, hesitates to operate among a group of students who may ask questions that are embarrassing. This year we have provided a separate room, so that all the operations of post-graduates will be done apart from the clinic of the regular students. We are looking forward with interest in this feature of our course next month.

As to the teaching which we should give for Army dental service, I hardly know what to say. Ordinarily we would expect the teaching to be directed towards the service that is to be performed. Yet under the present regulations covering Army dental service, by which each enlisted man in the army is provided an average of two hours a year in the dental chair, they must go in and out like clock-work and it is absolutely out of the question for men in the dental corps to practice good dentistry. Many fine young dentists will be spoiled in the dental service under present conditions. They will all need to come to post-graduate schools when the war is over.

In the planning of courses for Army dental service, there are certain items which we feel ought to be included. The dentist who enters army service ought to be as familiar as may be with plastic and oral surgery, even tho under the regulations he is not privileged to operate on the soft tissues. We all know, however, that when these men get into a base hospital and patients are coming in faster than they can be handled, dentists are going to be given opportunity to do whatever they are able to do. And for that reason we ought to expect that those men in the service who have ability will have opportunity to do some things which are not provided for in the regulations. At any rate, it certainly will be a great advantage for every dentist in army service to know as much as possible of the anatomy of the head and neck and plastic and oral surgery.

Briefly stated, our course will give 30 hours in dissections of the head and neck, eight hours in surgery of the cada-

ver by demonstration; 36 hours in strictly oral surgery clinics, 22 hours in the making of splints for the treatment of fractures, 20 hours in surgical clinics at hospitals by general surgeons, those clinics being as largely surgery of the face as the material will permit; and 20 other hours in related matters such as radiography, anesthesia, extraction, etc. This makes 136 hours of laboratory, clinic and demonstration periods, to which should be added about 36 hours of lectures covering the same subjects, making a total of 172 hours in four weeks.

In the course for the general practitioner of dentistry, naturally much of the surgery is omitted, reducing the oral surgery to 24 hours, and including 48 hours in operative, prosthetic and orthodontic procedures.

Our school, like Washington University, has had one four-weeks' course for the Plastic and Oral Surgery Division, under the direction of the Surgeon General, and we have another one scheduled commencing the fourth of March. For this course our own school and the members of its faculty give a comparatively small part of the work, the teaching staff being composed of the members of the faculties of the other dental and medical schools in Chicago and surgeons operating at the various hospitals.

I wish to strongly support the suggestion of our President that committees should be appointed to investigate the question discussed in his address. I hope that the committee suggested relative to the work which is to be done by our schools in the matter of war dental service, will be able to make a report at this meeting, because this is a matter which ought not to lay over. I am sure that each member of the faculties of our schools is quite willing and anxious to do his part in order that those men who are going into the dental corps shall render the best possible service, thus reflecting credit upon the dental profession and those of us who are teachers.

F. B. Moorehead, Chicago.

At the present time there are two courses of instruction under government direction; first, the course in plastic and oral surgery under the direction of Major Vilary P. Blair of the Surgeon General's Office, the object of which is the special training of men to participate in the plastic and head surgery units. The second course is one given by the committee on dental education, the sub-committee of the Dental Committee, general Medical Board, which has as an object the preparation of men for military dentistry. Courses have already been given at the University of Michigan, University of Minnesota, University of Pennsylvania, Northwestern University, Chicago College of Dental Surgery and Forsyth Infirmary.

Courses under the direction of Major Blair will doubtless be continued, but the courses under the direction of the Committee on Dentistry will scarcely be needed inasmuch as the Surgeon General has organized a school at Fort Oglethorpe for the military training of members of the Dental Officers Reserve Corps.

In the matter of post-graduate work, we should differentiate between graduate work and post-graduate work. Graduate work is one thing, and post-graduate work is another thing. The question of the status of graduate work is well defined, and colleges and universities have adopted well known standards governing graduate instruction. No activity in university life is more closely surrounded by iron clad rules than that of graduate instruction. In the first place the graduate student must have certain definite preliminary education before undertaking graduate work. In the second place the graduate student is taking a course which leads to a higher degree. In the third place the teacher in a graduate institution must have certain scholastic attain-

ments before he can give instruction to graduate students. For example, at the University of Illinois no man can become a member of the graduate faculty who has not a Doctor of Philosophy degree, for the simple reason that many of the graduate students are taking a doctor of philosophy course and it would be an anomalous situation for a teacher to undertake to teach a course for which he himself had no credit. It would seem, therefore, that when this body takes the question of graduate work he should do it with a feeling that the standards will be in keeping with those already inaugurated by our best universities.

I imagine it will be some time in the future before any appreciable amount of instruction in graduate work in dentistry will be possible, as we do not have many students with bachelor's degrees coming to us. The question of post-graduate work should be taken up by this body, and in some way or other standardized. Post-graduate work in this country is in bad shape. A man will leave his practice and take a trip of ten days or two weeks to Chicago or New York or some other educational center, advertising the fact in his local papers that he is taking a post-graduate course in some institution, and then when he arrives he will spend his time enjoying life and possibly attend a few clinics. He again takes advantage of his return home to advertise the fact that he has completed a post-graduate course. It seems to me that this is the worst kind of advertising, and no institution should permit a man to come in for work unless he does so under definite prescriptions. He should remain a specified length of time, and do a certain amount of work by the clock. For the man who wants to learn, and is anxious to improve himself, the doors of the university should be wide open, but the fellow who comes to loaf for a few days, picking up perhaps an idea or two which he may exploit on his return home, should not be allowed the privilege of the institution. I am always glad to have men visit my clinic who may be passing thru Chicago, but the student who is coming for business ought to stay a certain length of time and do a specified amount of work. It would not be a difficult thing to have a minimum requirement for post-graduate instruction. As Dr. Black has suggested, we should make some provision for the student who asks for special training in prosthetic dentistry or operative dentistry or therapeutics. Our institutions should encourage conscientious seekers after higher training and discourage the loafer by refusing him admission.

Alfred Owre, Minneapolis.

So much has been said in regard to post-graduate instruction that we ought to have the term well defined. We tried to do that last year. It is used in an ambiguous sense at the present time. The President states that he has sent out questionnaires. I wonder if, instead of post-graduate work, they do not refer to extension work for three or four weeks or something like that. There are only eight schools offering graduate work, where if a man is qualified he may receive instruction, be assigned a problem and receive the degree of Master. His thesis may be on oral surgery, or a similar subject. It seems to me we have these two distinct things to discuss. As Dr. Moorehead has said, graduate study is taken care of in the universities, we have nothing to do with it. In Minnesota, it is in the graduate school that graduate courses are offered in medicine, and the Medical Bulletin refers to the Graduate School Bulletin. There, it seems to me, is our future also. And the graduate school must be in charge of the graduate degree.

To illustrate: We had a student present himself who had had four years of under-graduate work. That is prerequisite. And he had covered the ground in elementary biology. His topic was "The

Bacteria of the Mouth." He said: "What must I do to qualify for the degree of Master of Science? My thesis will be on the bacteriology of the mouth." In the first place he was to take an advanced course in biology. In the next place he had had only an introductory course in bacteriology. He was to work in the clinic as much as was necessary to secure his bacteria, and grow his cultures in the laboratory. Now, if his thesis is of the nature that is necessary for the Master's degree, he will get his degree, and not otherwise. He confines himself to practical biologic study.

Taking this illustration in connection with the illustration given by the President, we would have to modify greatly the number of hours that Dr. Biddle recommends that we devote to a variety of so-called graduate subjects.

As to the degree itself, I think now is the time when we should discuss the abolition of the Doctor's degree in dental surgery, substituting the Bachelor's degree in dental surgery, to be given at the end of four years. At the end of the fifth year we should give the Master's degree in dental surgery, and then at the end of two or more years of study we could give the Doctor's degree in science. The problem assigned in securing this degree would be infinitely more difficult that that assigned for the Master's degree. After the student had the Bachelor's degree he would be assigned work in bacteriology in its different subdivisions, and work in the infirmary as well. In obtaining the Master's degree, for instance, in Orthodontia, he might write a thesis on the etiology of irregularities, referring to certain conditions favoring irregularity. But in writing his thesis for the Doctor's degree he would make it a world study. He would not only study his subject from the world standpoint, but embody in it his concept of economic and social conditions the world over. Therefore he would present a thesis which would have the characteristics of a doctor's work.

Now, whether we want to or not we are going to have this question forced upon us. That is the challenge of the present moment. The President referred to the glories of the past, and, of course, I do not want to say anything against that; but I should rather accept the history of the past as a perpetual challenge for something better.

Dr. Black discussed two types of graduate courses. It seems to me that they are one type offered in a different way—the same graduate problem, which he wants in one year, or in two years, or in more or less time; it does not make any difference as long as the requirements are met.

I agree with Dr. Moorehead in regard to war dentistry. That is another one of the great challenges.

H. L. Wheeler, New York City.

I would like to say a word or two upon a subject that was not touched upon, but which should be covered. Mention was made of the necessity of those dental students who will enter the service of the Army, especially to practice Oral Surgery, going into departments of medical schools to obtain some of their knowledge. It seems to me that it is also necessary that the medical men practicing in the Army should have an opportunity to take a course in the dental schools. Some have done that, and in New York Professor Carr has given to a large number of medical men in the Navy, sent there by authority of the Surgeon General of the United States Navy, a short course in minor surgery of the mouth. It is as essential on one side as on the other. And I would like to suggest that in these courses the necessity of the young surgeon in the Army and Navy having to do minor surgery in the mouth be considered, and that they be given an opportunity to enter the dental schools to take these courses.

Henry W. Gillett, New York City.

I thank the Chairman for the opportunity of introducing myself to this body. I have been much interested in the President's address and in the comments it has brought out. Being, as many of you know, actively interested in an effort to establish courses in New York for graduate dentists, courses of a type that shall attract men who come for real instruction, we are endeavoring to so arrange those courses as to meet the varied demands of men who have been in practice as a rule for several years. In the inception of our work it was suggested that we should limit our admittance to men who had at least five years of practice. The rules of the Regents of New York State made this seem unwise but we were finding it desirable to discourage men from entering who have not been in practice long enough to place them in a position to grasp the type of instruction that we present. Our courses for graduates have been aimed at providing opportunity for broadening the knowledge of men who have had inadequate instruction as under-graduates, or inadequate experience by reason of location subsequent to graduation and who consequently feel the need for instruction in advanced method. Therefore our courses have been aimed at giving those men an opportunity to select instruction along the lines that they desired. It may be of interest to you to know that our experience indicated an overwhelming demand for that type of instruction.

We have endeavored to put in practice the plan mentioned by Professor Black, namely: The arrangement of courses so as to offer men from a distance opportunity for intensive study for comparatively short periods so that they may be constantly busy during their stay. We have arranged other courses so that similar instruction is offered at other times to local men for from one to three days a week, thus spreading the course over longer periods.

Otto U. King, Secretary-Editor, National Dental Association, Chicago, Illinois.

I assure you that it gives me great pleasure to have this opportunity to speak before this organization, for the American Institute of Dental Teachers is the dental profession's grand alma mater. Dr. Biddle, our president, has focussed our attention on one of the livest subjects before the dental profession today. This organization, as well as Dr. Biddle, is to be congratulated on the practical outline that he has presented—making it possible for us to carry out this work in the curricula of the dental colleges.

One thing that I desire to impress on each man, who may be connected with dental college work, is the fact that there is a tremendous responsibility resting upon all dental schools of this country, namely, the carrying into practical effect some sort of post-graduate school work. In my official connections with the National Dental Association, I notice an increasing demand, which has permeated the entire dental profession for higher educational attainment. Local and state dental societies, as well as small groups of men, thruout the length and breadth of this country, are endeavoring to meet this crying need by giving post-graduate courses of instruction at their dental meetings. Therefore, at times I have felt that this organization has failed to interpret in a practical way these indications of discontent in our profession and to take advantage of it by giving leadership.

I remember a few years ago when it was a very difficult thing to get men together to hear any sort of a scientific paper on dentistry or allied subjects. Today, the men who attended our conventions listen intently to the reading of the most scientific papers. They sit there just like—well, they just sit there and they stay there until the meeting closes.

And now our exhibitors who come to

our meetings are saying, "we must have a specified time on the program for our exhibits or it will be useless for us to attend the meeting." In other words, formerly we had to use the megaphone and close up the exhibits to get men into a session to listen to the reading of a paper. Now, the tables are turned and our state society program committees find it necessary to give the exhibitors a special place on the program.

Only a year or so ago, in Kansas City, we saw the unusual sight of a thousand dentists attending a one-week post-graduate course. The men taking this course paid a special fee for it and seemed to be perfectly satisfied with the results attained. Many state societies during the last two years have inaugurated special post-graduate courses and several have already been announced for this year. Therefore, I again repeat that there is a tremendous responsibility resting upon this organization for the outlining and carrying into effect, in every dental college in this country some sort of a special post-graduate course. For I contend that the dental instructors and the dental college should be the leaders in this educational movement. I am wondering if our dental schools are going to miss this opportunity of leading our profession to a higher status of educational and professional attainment?

Dr. Owre: The question was brought up as to who should offer these courses, extension as well as graduate courses, but particularly the latter. These should be left within university, which should take advantage of practitioners who have reached a high degree of specialization in the various fields. In that way they could organize their material and become stabilized by the university. The best illustration of that, of course, is the Mayo Clinic, which virtually offers all the graduate work in medicine, outside of the sciences, in Minnesota. It is along such lines that we must evolve until the time comes when we can actually have all these men for state institutions.

Dr. Gillett: Dr. Biddle's schedule prompts me to say that it appealed to us at Columbia, in establishing courses for graduate dentists there, that the real need was for something different than it had been possible to offer in so-called post-graduate work of the societies, which were largely lecture and demonstration courses. We have had a good deal of experience with courses of that kind in New York and thruout the East and have found a demand for something different. We found a considerable part of the profession becoming satiated with that type of instruction and asking opportunity to do practical work under the eye of competent instructors. For this work we have provided very perfect equipment and demand earnest work of every practitioner who enrolls. We accept only such members as can work advantageously.

Dr. Biddle: I am greatly pleased with the discussion which my paper has brought forth. With reference to Dr. Hillyer's remark concerning a minimum schedule, would say that the schedule of hours I had in mind is not even a minimum schedule, merely a suggestion, for I think it would be presumptuous for any one member to furnish this organization with a complete schedule. If a committee were appointed to evolve a plan it should be submitted to this institution, only after consultation with various heads of departments of schools of this membership. While I have not furnished a minimum schedule, I had figured upon 1344 hours, a little more than is included in the schedule suggested by Dr. Hillyer. Orthodontia was purposely omitted from my list under graduate work inasmuch as I deemed it best taken care of in a separate course under Post-Graduate Courses. Operative and Prosthetic Dentistry, Crown and Bridge Work were not

allotted as much time as one of the discussers suggested, inasmuch as they are exhaustively considered in regular courses.

Dr. Owre says that eight schools are giving graduate instruction. Upon investigation, he will find that this is post-graduate work and in many instances, sporatic at best. In fact, there are but three schools giving regular, systematic, post-graduate courses. So far, investigations show that there is but one school giving graduate work with its accompanying degree at the end of the year. Regarding the time spent in graduate work, the writer does not mean to infer that all such work could be done in one year in evening classes, but that it may be done in day or evening classes extending thru one year or a number of years, as best suited to the needs of the various schools.

I cannot agree with Dr. Moorehead that graduate courses are in the future and need not be seriously considered at this time. As the writer stated previously, one school has already inaugurated such a course and awards a graduate degree and within the near future, three other schools at least contemplate similar action, each planning to confer a different degree for practically the same amount of time and work. Therefore, I am of the opinion that the time has now arrived for some systematic, standardized graduate course to be developed by this teaching body to the mutual advantage both of this body and of the profession.

For a number of years, graduate and post-graduate work has been discussed at our annual meetings. This year the president's address was prepared with the one purpose in mind, that it might be the humble beginning of an earnest effort to outline a course, which with minor modifications for individual cases might be adopted by any school desirous of considering advanced work in dentistry, so much in demand by many members of our profession.

I thank the members of the Institute, and especially the discussers of my address for their kindly consideration.

LEGISLATION FROM A DENTAL STANDPOINT.

By Alexander H. Reynolds, D. D. S., Philadelphia, Pa.

(Read before the National Dental Association at Its Twenty-first Annual Session, New York City, N. Y., October 23-26, 1917.)

THE question of securing dental legislation is one that is closely allied—in fact interwoven—with the growth and progress of dental society work, particularly that of state dental societies. In 1868, when the Pennsylvania State Dental Society was organized, it was created for the stated express purpose of securing the passage of a law to regulate the practice of dentistry, and while the first law was deficient in many ways, it was a grand beginning. We have had several new laws since that time, as well as several amendments thereto, yet the first act was the greatest step forward that dentistry has ever made in Pennsylvania.

More has been accomplished in the

way of successful legislation in the past ten years than in the whole previous history of dentistry. Since Alabama passed the first law regulating the practice of dentistry we have been advancing steadily onward, until today every state in the Union has a good dental law, and most of them are striving for even better ones. Many states have the yearly registration feature, and one or two have permanent state secretaries, with the idea that such an officer be paid sufficient salary to enable him to devote his entire time to the work if necessary.

Some of the states have been able to secure a law that prevents the advertising fakir from buncoing the public. Others have gone further and prevented the use of company names and requiring each man to practice under his own name entirely and display the names of his assistants in as large type as his own. The middle western states are the ones which have been able to secure the passage of the most intelligent as well as the most stringent laws, they neither being tied by the old blue laws nor controlled so easily by the politicians.

Delaware, our neighbor on the south, has broken away from its shackles and had an iron-clad law passed by the last legislature. The essayist had a small part in the passage of that law, due to the fact that the opposition to its passage in the legislature was led and engineered by an advertising dentist in Wilmington. The president of the Delaware Board appealed to the Secretary of the Pennsylvania Board for assistance, as he had heard that this same man had been arrested and fined in this state for practicing dentistry illegally. I wrote the attorney for the Legislative Committee a full account of his arrest, etc., and when he appeared before that Committee he was confronted by the statement, and his argument against the new law was nullified. The secretaries of the various examining boards endeavor to keep each other informed of the new laws and assist one another in getting improved dental legislation. As you are no doubt aware, the present law that provides for the employment of dentists in the United States Army and Navy was secured principally thru the efforts of this association, and the Legislative Committee is at present engaged in an effort to secure a large number in the corps and higher rank for those already in. The effort is also under way to establish a separate corps for the dentists, so that our profession will not be under the control of the medical department.

The greatest difficulties encountered in securing dental legislation are the lack of organization among the dentists and the fact that the public generally is not educated to the importance of dental work. Often the work is left to a committee who has not given the matter sufficient study and consideration, and who do not submit the proposed act to the proper legal authorities in reference to its constitutionality and its ability to withstand attack in the courts of the state.

A number of instances could be given of dental laws that have been passed by the state legislatures at the request of dental societies where apparent minor points have been overlooked that nullified the substance of the whole act. A lack of finances on the part of the societies or committees having the matter in charge is also often the cause of many deficient measures. In the opinion of the writer, the most satisfactory method to secure proper legislation would be to have a permanent committee of the state society with power to employ by the year an attorney learned in the framing of laws—one who would keep in touch with legislation affecting dentistry thruout the various states. If the occasion arose when it was desirable to secure

the enactment of new dental legislation the committee would then be in a position to intelligently draft such legislation. The new bill—or amendment—should then be submitted to the state society and carefully reviewed by a second competent attorney for inconsistencies and phrases that might render the main provisions of the act void. The attorney should be employed yearly at a salary that would enable him to follow its course thru the legislature from the time of its introduction until it was finally signed by the governor.

Much might be said about the devious ways and means of securing the passage of desired legislation, but circumstances and conditions are likely to arise that make it impossible to give a set order of procedure, and the committee must adapt themselves to events as they occur, and insist upon the employment of a competent attorney as an absolute necessity.

DISCUSSION.

Dr. Crise, Kansas.

In order to awaken enthusiasm it is an advantage to magnify the work of the officer of the district. We have said a lot about the kind of a man we should elect for a secretary and we send him about the state and he gets something for it. Now we all have a little streak of vanity and like to be patted on the back, and if we want to increase enthusiasm it is a good thing to encourage the district officers as well as the officers of the state societies. We have held our State Society in Topeka for the past five years because it costs less to hold the meeting there and because it costs the men less to come there on account of the railroad facilities. All the railroads come to Topeka. Our idea is to get every man who possibly can to come and so we make the expense as little as possible. You may talk all you want to here about raising the fees, you fellows here have all the enthusiasm necessary and you come here for information and to work for the other fellow and you take something back that will help the other fellow and what you do you are glad to do gratis, but many are looking to the financial side. There has been a complaint that many men have refused to do draft work gratis and I feel that it is hard to divert dentists from the financial side of life.

In our State we have tried to limit that sort of thing. Our dues are six dollars and the men do not like to have them increased, so we have tried to have conventions up to the times without increasing the dues. I do not know whether I am in favor of having all outside talent. We have a good set of men in Kansas and Oklahoma and sometimes we overlook splendid talent when we never ask them to do anything. They are ingenious and may be able to give us some very good points. I think it is good policy to use our own talent. We have some outside talent and this year we are going to have two good men, Dr. Black, of Chicago, and Dr. Best, and we are going to bring them forward and put Kansas in the map again that we are doing something in our state. I can go over into Iowa and they will say a great deal about what Crise can do, but they have other men in Kansas who are just as good or better and just as efficient and they can demonstrate better, yet they are never brought forward. I am in favor of developing the latent talent in our states and in that way they become better men and better dentists and in that way we encourage the profession as well as the men in their home towns.

Dr. Reynolds, Philadelphia: Dr. Crise spoke of the dentists not being willing to take care of the drafted men because it did not pay. In my section not one dentist refused, and my section consists of West Philadelphia, which

has a population of over 300,000 and many drafted men.

I would like to ask whether in Massachusetts your law allows under-graduates to appear before the examining board.

Dr. Taylor, Boston: In Massachusetts we still have one of the old members of the Board of Registration tho at present there are four new members on the board. Our present Governor has been a reactionary in regard to appointments on the State Board but our law is good. We have to contend with politics the same as some other people but the attempt is made to carry out and develop our policies.

Dr. Reynolds, Philadelphia: One point was not brought out and that is with reference to admitting men to state meetings who are not members. We have many men in the eastern part of Pennsylvania who will not attend a meeting in the western part of the state because of the distance, and find it easier to go to the New Jersey meeting. New Jersey should not admit a man from Pennsylvania unless he holds membership in the Pennsylvania State Society. We have adopted that plan and when a man from New Jersey comes to one of our meetings he must present a card from the New Jersey Society, and if all the state societies would adopt such a plan it would be much better and would bring men into the societies who have no affiliation.

Dr. Wright, Ohio: I would like to ask for information as to whether any of the state societies have any method of cooperation with the Boards of Examiners in the prosecution of malpractitioners.

Dr. Gelston, New Jersey: If I remember correctly, during the discussion of Dr. Reynolds' paper some one asked if any of the State Societies cooperated with the Board of Examiners in prosecuting illegal practitioners. In New Jersey, in each county the State Society appoints what they term a County Prosecutor. It is the duty of this appointee to notify the Secretary of the State Examining Board, of any infractions of the law. Our State Society Journal publishes alphabetically and also by counties, the names of every licensed practitioner in the State. If a new name appears in that county, by referring to the Journal we can easily see if he is licensed; if not, the county prosecutor informs the Secretary of the State Examining Board, who turns it over with any other information he may have, to the corporation they employ for prosecuting all cases. There was one case in my section of the State (Dr. Forsyth will remember this case): a dentist practicing for twelve years without a license. He started to practice when the system of prosecutions was very poor, and we always looked upon him as a licensed practitioner. One day his name was mentioned; one member of our society did not remember seeing his name on the list and looked him up; he was not licensed. Within a few days prosecution was started, he was found guilty, and paid a fine of $—. The Examining Board employs a firm termed the Corporation for the Suppression of Vice and Imposters. They go after these illegal practitioners and get them. Dr. Forsyth informs me the fees for this firm the past year have been about $1000, and they are worth every penny of it.

THE CHEMICAL ACTION OF SOIL BACTERIA ON CALCIUM PHOSPHATES WITH THE CHEMICAL ANALYSIS OF THE HUMAN TEETH.

By J. E. Hinkins, D. D. S., Chicago, Illinois.

(Read before the National Dental Association at Its Twenty-First Annual Session, New York City, N. Y., October 23-26, 1917.)

IN A PREVIOUS paper on "The Composition of the Dentin and Enamel of Human Teeth,"[1] in prosecuting our researches on the erosion of tooth structure and cement fillings, it became necessary to have an accurate knowledge of the composition of the enamel and dentin of the human tooth.

While a few analyses have been published by Hoppe, Seyler, von Vibra, Berzelius, Gallippe, and others, these varied so much among themselves that it was evident that either human teeth vary markedly in composition, or that the conditions under which the analytical work was performed varied greatly among the different scientific workers. Furthermore, the workers along these lines have paid little or no attention to the composition and properties of the organic constituents of the teeth. So far as the writer is aware, no determinations of the per cent, of carbon, nitrogen, hydrogen or sulphur have been made. Since teeth contain water mechanically included, as well as in chemical combination, and since the amount of water given off will depend upon temperature and fineness of material, it became evident at once to the writer that the conditions of treatment of the teeth and analytical work must be laid down and adhered to thruout, if consistent results are to be obtained. It is evident that the fineness of the powdered tooth dentin or tooth enamel would play a great role in the results obtained in the determinations of the per cent. of water, for example, or in the per cent. of carbon, hydrogen, nitrogen and sulphur obtained by combustion methods.

The material analyzed was prepared as follows: The teeth selected were cleaned thoroly in water, and freed from adhering flesh or gum particles by scraping them well. As nearly all of them had some decayed portion, this was thoroly removed, so that only solid structure remained. No markedly discolored teeth were used. The pulp was removed in all analyses.

As it is evident that some water is mechanically enclosed in the teeth, and that some is in chemical combination, experiments were made to determine the difference in loss of water in a vacuum and in a drying bath at 110°C. A sample of 38.7112 grams of whole teeth was dried in a vacuum eleven days. In this time the loss was 2.024 grains, or 5.23 per cent. of moisture, which was lost in vacuo. In order to learn the amounts of water which vacuum dried teeth lose at 110°C, a sample of 57.030 grams whole teeth, which had been dried in vacuum, was heated eight hours at 110°C. The loss in weight was 4.100 grams, or 7.19 per cent, water part of which was without doubt water of crystallization or constitution.

In order to see the influence of the size of the particles on the amount of water lost at 110°, a sample of the dentin of the teeth which had been dried at 110° was pulverized in a mortar, till all passed thru a sieve having 40 meshes to the linear inch; 24.245 grams of this was dried at 110°C to constant weight; the loss was 1.178 grams, or 4.86 per cent., over that lost by whole teeth at 110°C. It is plain, therefore, that the fineness of the division of the teeth will play a very important role in affecting the results obtained. In order, therefore, to make my results uniform, I analyzed dentin and enamel which passed thru a 40-mesh sieve and was dried to constant weight at 110°. It will be seen that vacuum dried teeth lost about 12.00 per cent. of water when pulverized and dried at 110°. The air dried whole teeth lost about 5.00 per cent. in vacuum, about 7.00 per cent, when dried as whole teeth, and (dentin) about 5.00 per cent. when pulverized and dried—or about 17.00 per cent. of water. This dentin was analyzed and the data are given below.

A sample of pulverized enamel, dried in a vacuum, was heated to constant weight at 110°; 6.6445 grams lost 1.021 grams or 15.37 per cent.

It will be seen, then, that the air dried teeth that were analyzed lost about 15.50 to 17.00 per cent. when pulverized to pass thru a 40-mesh sieve and dried at 110°. If the material were pulverized finer there would without doubt be a greater loss in weight at 110°.

A description of the analytical methods employed will make the work clearer. The ash was determined by igniting a weighed portion of the dentin or enamel to white heat. The ash was always colored dark gray or nearly black; the cause of this has not yet been determined, but will be. The loss in weight by ignition is made up of water, carbon dioxide, fat and other organic matter, probably albuminous in nature, and perhaps other substances not yet determined.

The carbon dioxide was determined by treating the substance with acid and collecting the liberated gas in Geissler potash bulbs. The phosphoric acid was determined in the usual way by means of the magnesium ammonium phosphate reaction. The calcium was determined by precipitating it as calcium oxalate and titrating this by means of N/10 potassium permanganate. The magnesium was determined as magnesium ammonium phosphate. The silicia was determined as usual. As far as I know, the iron and alumina, sulphur, chlorine, sodium, carbon, hydrogen and nitrogen have been determined by me for the first time. It is true that Berzelius gives an item "sodium salts" in his analysis of dentin (Tome's Dental Anatomy, Sixth Edition, page 47), but a glance at the analysis shows that this item is really made up of the difference between the actually found percentages of the known substances and 100 per cent, and should be called "unknowns." Instead of Berzelius' 1.50 per cent., sodium salts, we find 0.63 per cent, sodium. The per cent. of carbon and hydrogen was obtained by the Dumos combustion method. The sulphur was obtained by two independent methods, involving different principles, and the agreement is very good. In one case the sulphur was determined by Glaser's sodium peroxide method, and in the other analysis by Morse and Gray's combustion method. The results make it very probable that this sulphur exists as "organic sulphur" and not as sulphates. The nature of these sulphur compounds will be a subject further of investigation by me. I have definitely established the presence of chlorine and sodium in the teeth and determined the amounts, which are small.

A word here in regard to the flourine contents of the teeth. The various analyses of the teeth given by others have

shown varying amounts of fluorine, but it is the opinion of the writer that the methods employed by others in the determinations of the fluorine are open to very serious objection. The writer is therefore engaged on a new method for the determination of this substance, and this will be reported later.

There must be other substances present in small amounts in the tooth structure which have not yet been identified. The difficulty of determining these small quantities is much greater than that of the work given you now. The study of the nature of the organic constituents of the teeth will be made a specialty. The writer feels that too little attention has been paid to this part of the work, and that it is only by a careful investigation in this direction that we shall be able to understand more thoroly the nature of the decay and erosion of the tooth structures.

As the results of our analyses are given in tabular form in the issue of the Dental Review referred to it is unnecessary to quote them here.

In view of what has been previously said, it is interesting in this connection to quote from an article on "The Analysis of Human Teeth" by W. H. Pepys, published in a book by Joseph Fox, 1814, entitled "The Natural History and Diseases of the Human Teeth." Pepys says that several good analyses of bone have been published, but he believes no accurate analysis of the teeth has yet been offered.

"Bone, it has been observed, when exposed to the action of acid menstrua, becomes dissolved; that is to say, the solid or constituent substance of them is abstracted, and a gelatinous matter is left of the form of the original bone.

"Nitric, muriatic, and acetic acids are capable of producing this change, which is accompanied with a liberation of an aeriform fluid, that precipitates lime in lime water, changes vegetable blues red, and by its gravity is known to be carbonic acid gas. These acid solutions yield a copious precipitate with pure ammonia, which is again soluble in either of the acids. After the precipitation by pure ammonia, the solution of the carbonate of ammonia will still produce a new precipitate.

"The precipitate of the first solution, by pure ammonia, as noticed above, is soluble again in the acids before mentioned; these solutions yield, with a solution of acetite of lead, a copious precipitate, proving the presence of phosphoric acid.

"The precipitate obtained by the carbonate of ammonia is also soluble in either of the above acids, but with effervescence; and these solutions are not precipitated by acetite of lead; they fall, however, with oxalate of ammonia, carbonate of ammonia, or precipitate of lime.

"The great solubility of the phosphate of lime, in even the weakest of the acids is very extraordinary. Phosphate of lime mechanically suspended in water, is speedily and completely dissolved by passing a copious stream of carbonic acid gas thru it.

"With these facts before me, I have ventured to examine the several specimens of the human teeth; as the enamel, the bone, or roots, the teeth of adults, and the shedding teeth of children.

"Previous to an account of the analysis, it may not be uninteresting to notice the action of some of the articles of the materia chemica on the teeth.

"Sulphuric acid, of the specific gravity 1.83, appears at first to have no action; in the course of an hour small bubbles are perceived, the roots become blackened, and in twelve hours the enameled part bursts, cracks, and separates, accompanied with an evident formation of selenite, by the action of the acid on the lime, which enters into the composition of the teeth.

"Nitric and muriatic acids of the specific gravity of 1.12, act instantly on the tooth, accompanied with an evolution of a quantity of small air bubbles

from the whole of the surface; about eight times their weight of these acids are sufficient for the solution of the solidifying principles of the teeth. The mass left undissolved has nearly the original form of the tooth, is flexible, semi-transparent, and easily divided by the nail.

"The dilute acetous acid (distilled vinegar) has a very trifling action, but when concentrated, acts both on the phosphate and carbonate of lime.

"Boiling nitric acids acts strongly on a tooth, with the evolution of carbonic acid, and a considerable quantity of azotic gas. The gelatine and solid substances are dissolved as the surfaces present themselves; but the operation being stopped at any part of the process, the residuum is firm and hard, but reduced in size proportioned to the time the tooth has been acted upon.

ANALYSIS OF THE ENAMEL.

"One hundred grains of the enamel of human teeth, (carefully rasped) were placed in 600 grains of nitric acid of the specific gravity 1.12. Slight effervescence ensued, and after twelve hours 200 grains more of the acid were added. Allowing for the loss by evaporation in a corresponding vessel, after thirty-six hours it was found to have lost four grains and a half.

"It was then diluted with four ounces of distilled water, precipitated by pure ammonia, and then filtered.

"The precipitate obtained being dried in a water bath, at 212°, weighed 102 grains. It was then ignited, after which it was found to weigh 78 grains.

"The filtered solution was then precipitated by carbonate of ammonia in solution, and filtered.

"The separated precipitate being dried in a heat of 212°, weighed six grains. Enamel then consists of

Phosphate of lime	78
Carbonate of lime	6
	84
Water of composition and loss	16
	100

"A loss of 16 grains here takes place, which is easily accounted for, from the impossibility of directly ascertaining the state of dryness in which the ingredients existed originally in the enamel; for we have seen, that by drying the phosphate of lime in a heat of 212°, (after which it had the appearance of being as dry as possible) it yet contained so much moisture, as to yield a gain of 8 grains in the analysis.

"On the other hand, when ignited, its state is driven to the opposite extreme, and there is a loss of 16 grains. It is impossible, however, that the materials could exist in the teeth, in a state of dryness to be compared with that produced by exposing them to such a high temperature. And it appears but reasonable to conclude, that the real quantity of moisture lies nearer to that given by the heat of 212°, than to that given by ignition, and consequently that the 16 grains lost by exposure to such a high temperature, were chiefly water.

"Bone, or roots of teeth, yielded by analysis in 100 grains:

Phosphate of lime	58
Carbonate of lime	4
Gelatine	28
	90
Water of composition and loss	10
	100

The teeth of adults yielded on analysis in 100 grains,

Phosphate of lime	64
Carbonate of lime	6
Gelatine	20
	90
Water of composition and loss	10
	100

Specific gravity of adults' teeth,.. ..... 2.2727

The shedding, or primary teeth of children, yielded on analysis in 100 grains,

Phosphate of lime	62
Carbonate of lime	6
Gelatine	20
	88
Water of composition and loss	12
	100
Specific gravity of children's teeth,	2.0833

"In these analyses, as in the former, the phosphate of lime was also exposed to a red heat, and consequently was reduced to a greater degree of dryness than that in which it existed in the tooth.

"In all of them the carbonate of lime was dried in a heat of 212° (above which it would have been liable to decomposition) and the gelatine of the three last in the same temperature."

ANALYSIS OF TARTAR.

Pepys says that tartar of the teeth, of a dirty white color, inclining to brown, stained in part yellow and green, spongy, porous texture, yet considerably hard, when it is detached in large pieces exhibits the impression of the teeth on which it was deposited. The pieces which were examined were dry and free from smell. Specific gravity 1.5714.

"Sulphuric acid 1.85 is immediately blackened, the substance becomes spongy and soft, but no complete solution takes place.

"Nitric acid 1.12 acts in nearly a similar manner on this substance as on the teeth. A gas, which has the negative properties of nitrogen, is evolved in small bubbles, and a flocculent mass, of the form of the piece immersed, is left.

"Sodium of potash, boiled for some time upon it, had but little action; the tartar became whiter, the solution yellow; upon the addition of nitric acid to the separated solution, the color nearly disappeared without any precipitate being formed; ammonia reproduced the yellow color.

"The flocculent substance left by dilute nitric acid, after washing off the acid, being boiled with solution of potash, was not wholly dissolved; the solution became yellow. Nitric acid being added, discharged the color, which ammonia reproduced.

"Water boiled for some time upon tartar gave no precipitate or turbid appearance on the addition of solution of tannin.

"Tartar exposed to a red heat, in a silver crucible, smokes, accompanied with a greasy smell, is blackened in a similar manner to bone, and becomes more easily soluble in nitric acid, leaving a carbonaceous residuum.

"The solutions of potash which have been boiled on tartar, being neutralized with nitric acid, gave no precipitate with solution of nitrate of barytes.

ANALYSIS.

"Fifty grains of tartar of the teeth were placed in 400 grains of nitric acid 1.12; nitrogen gas was slightly liberated; in twenty-four hours it was diluted with two ounces of distilled water, and then filtered.

"The solution was then precipitated by ammonia, and filtered; and upon the addition of carbonate of ammonia, remained clear; and, when ignited, it weighed 35, which were again soluble in dilute nitric acid, giving a copious precipitate with solution of acetate of lead; this precipitate, washed, dried, and exposed to a flame, urged by a blow-pipe, fused into a globule, accompanied with a bright phosphorescent appearance, and was therefore phosphate of lead.

"The substance not soluble in nitric acid, was washed and dried at 212°, weighed 15 grains, and adhered firmly to the filter.

"The 15 grains of the last experiment were boiled in a solution of potash

for a quarter of an hour; being separated, washed and dried at 212°, weighed 9 grains.

"The separated solution was of a yellow color, the addition of nitric acid produced no precipitate, but lost color, which was recovered by ammonia.

"The 9 grains of residuum, after treatment of the potash, were placed in boiling concentrated nitric acid, by which they were completely dissolved; and, by the test of tannin, proved the cartilage to have been gelatinized.

Tartar of the teeth consists of

Phosphate of lime	35
Fibrina, or cartilage	9
Animal fat, or oil	3
Loss	3
	50"

We shall now discuss the subject of soil bacteria and phosphates and in connection therewith quote freely from a joint article by Cyril G. Hopkins and Albert L. Whiting[2].

Decomposition of Organic Matter by Soil Bacteria.

The organic matter of soils consists of the remains of the plant, roots, stems, and leaves, of the farm manures. These are made up of proteins, sugars, starches, fiber, and other less important compounds, such as fats. All these constituents are subject to decay by bacteria. They are broken down by bacteria into less complex substances. This breaking down is not brought about by one kind of bacteria only, nor is it the result of but one process.

The importance of the action of decomposition products of the active organic matter of the soil on the solubility of phosphates is better understood by a consideration of three important and definitely recognized processes that have long been known to bring about the change of the nitrogen from the unavailable form, as it occurs in the protein of clover, manure, etc., to the readily available form of the nitrate, as found in calcium nitrate ("nitrate of lime"), sodium nitrate ("nitrate of soda"), potassium nitrate ("saltpeter"), etc. There are three known steps, or stages, in the biochemical process of converting organic nitrogen into nitrate nitrogen:

Ammonia Production.—The first process results in the change of the organic nitrogen to ammonia nitrogen. The ammonia (NH_3) is absorbed by the soil moisture (H_2O) and forms ammonium hydroxid (NH_4OH), or household ammonia. Much carbon dioxid (CO_2) is produced at the same time, and some of it, also, is absorbed by the soil moisture H_2O and then unites with the ammonia to form ammonium carbonate. The formation of this ammonium carbonate is represented by the following equations:

$NH_3+H_2O=NH_4OH$ (ammonium hydroxid)

$CO_2+H_2O=H_2CO_3$ (carbonic acid)

$2NH_4\ OH+H_2CO_3=2H_2O+(NH_4)_2CO_3$ (ammonium carbonate.)

Ammonia, ammonium hydroxid, and ammonium carbonate are alkaline. Red litmus is turned blue by these compounds. This should be carefully noted, as only acids are able to make phosphates and limestones soluble, as explained elsewhere.

If more carbon dioxid is produced than will unite with the ammonia produced, it will dissolve in the soil moisture, forming carbonic acid, and it may make raw rock phosphate soluble, as will be shown later. The soil moisture, however, will hold only a certain amount of this gas and any above that amount is returned to the air, which is the source of carbon for plants.

While the ammonia is being produced other compounds are likewise being formed, and such organic acids as the acetic acid of vinegar, the lactic acid of sour milk, the butyric acid of rancid butter, and many others results.

These will unite with bases such as lime, or will react with and decompose such mineral compounds as raw rock phosphate and ground limestone. In this way they will dissolve, or liberate, phosphorous and calcium.

The potato and the hay bacteria, which are very common in all soils, are vigorous producers of ammonia. Many other kinds of soil bacteria decompose organic matter into ammonia, carbon dioxid, and organic acids. These ammonifying bacteria, however, are unable to convert ammonia into any other compounds. By their action ammonia is always being produced in soils. It will be produced rapidly or slowly according to the conditions which prevail in a given portion of the soil. The production of ammonia in soils seldom approaches that observed in manure piles or composts. Small amounts of ammonia are always present in soils in a good state of fertility, but nitrate, which is derived from ammonia, is normally present in larger amounts.

The presence of nitrate demonstrates that a change from an alkaline condition to an acid condition is always taking place, for to produce nitrate requires nitrous or nitric acid. Even when manure and raw rock phosphate are composted, nitrate forms in large amounts, altho a test of the mass as a whole shows it to be alkaline; at many local points acid nitrogen must be formed, otherwise nitrate production would be impossible.

As ammonia is the most important compound obtained in the first stage of the decomposition of organic matter, this stage is called ammonification or ammonia production.

2. *Nitrate Production.*—The second and most important of the three stages consists of the oxidation of the ammonia to nitrite. In order to form a nitrate, nitrous acid (HNO_2) must be produced. This nitrous acid is very similar to nitric acid (HNO_3). The oxidation of the ammonia to nitrous acid by the nitrite bacteria is represented by the following equation:

$$(NH_4)\ {}_2CO_3 + 60 = 2HNO_2 + H_2CO_3\ 2H_2O)$$

The ammonium portion of the ammonium carbonate, an alkaline compound, has been converted into nitrous acid and carbonic acid has been set free. Both these acids will combine with some base. It is important to note that nitrogen of the alkaline substance, ammonia, has been converted, or transformed, by the biochemical removal of hydrogen and addition of oxygen into a strongly acid substance, nitrous acid.

This strong acid must be neutralized by some base, if nitrification is to proceed, for the bacteria are inactive in the presence of any noticeable amounts of strong acid. If the acid is neutralized, a nitrite is the product formed, such as calcium nitrite, $Ca\ (NO_2)_2$.

The primary purpose of this investigation is expressed in the question, will the calcium of pure rock phosphate, $Ca_3\ (PO_4)_2$, suffice as a base; and if so, will the phosphorus be made soluble? This will be answered by the experimental data reported in another part of this paper. If nitrite production takes place with tricalcium phosphate as a source of the base calcium, then the reaction must be represented by one of the following equations:

$$Ca_3\ (PO_4)_2 + 2HNO_2 = Ca_2H_2\ (PO_4)_2 + Ca\ (NO_2)_2 \text{ or, } Ca_3\ (PO_4)_2 + 4HNO_2 = CaH_4\ (Po_4)_2 + 2Ca\ (NO_2)_2$$

The bacteria which oxidize the ammonia to nitrite are called nitrite bacteria, or nitrosomonas, and one kind is known which is able to perform this intermediate step in the transformation of organic nitrogen to nitrate. These bacteria are unable to use any other than ammonium compounds.

3. *Nitrate Production.*—The third

and last stage is a simple oxidation of the nitrite to nitrate by the action of nitrate bacteria (nitrobacter). It consists in the addition, by biochemical action, of oxygen to the nitrite:

$$Ca\ (NO_2)_2 + 20 = Ca\ (No_3)_2$$

This reaction increases neither acidity nor alkalinity, but it produces nitrate, a compound of nitrogen which is preferred by nearly all forms of plant life. No liberation of insoluble compounds would be expected in this process, as no additional base is necessary, as seen by reference to the equation.

These nitrate bacteria live only on nitrite, and consequently they must await the action of the nitrite bacteria. While it is known that the nitrites are formed in soils under field conditions, only ammonia and nitrate can be found, as the nitrate bacteria change the nitrite as rapidly as it is formed.

Influence of Ammonia Production on Solubility of Phosphates.

As already stated, the most important product formed in the first process, or stage, of the decomposition of the organic matter is ammonium carbonate. The ammonium carbonate is alkaline, and consequently could not be expected to exert any action on the solubility of raw rock phosphate.

In 1904 Stalstrom, of Finland, conducted laboratory experiments on the solubility of pure rock phosphate with bacteria which produced ammonium carbonate from peat and from manure containing peat litter. He concluded that there was no appreciable increase in solubility of the phosphorus where the bacteria had produced ammonium carbonate over the sterile treatments in which no ammonium carbonate was produced. His experiments lasted forty-two days and were under conditions which would permit of determining soluble phosphorus were it present. His work is extremely interesting as it demonstrates that in the first stage of decomposition it has been impossible to measure any soluble phosphorus without the growing plant as an indicator.

Similar results have been obtained by the Rhode Island and Wisconsin Experiment Stations in attempts to detect soluble phosphorus in fermenting mixtures of manure and raw rock phosphates. When, however, plants have been grown in the mixtures, crop yields have demonstrated an advantage from the intimate contact of the phosphates with the decaying organic matter. Even when soluble phosphates are applied to similar mixtures, it soon becomes difficult to find soluble phosphorus owing to the alkaline condition of the mass as a whole. However, this does not preclude the possibility of phosphorus having been made soluble at many local points, strong evidence of which is afforded by the growing plants.

Solution of Phosphates by Action of Nitrate Bacteria.

Until the work reported by Hopkins and Whiting was undertaken, the part played by the nitrite bacteria is dissolving mineral compounds, and particularly raw rock phosphate, had never been investigated, and to determine this was the principal object of these experiments.

One of the authors made the following suggestion several years ago: "In the conversion of sufficient organic nitrogen into nitrate nitrogen for a hundred bushel crop of corn, the nitric acid, if formed, would be alone sufficient to convert several times as much tricalcium phosphate into soluble monocalcium phosphate as would be required to supply the phosphorus for the same crop."

The following equation shows that nitrous acid makes raw rock phosphate soluble.

$$Ca_3\ (PO_4)_2 + 4HNO_2 = CaH_4\ (PO_4)_2 + 2Ca\ (NO_2)_2$$

Expressed in other terms: 188 pounds of nitrous acid mixed with 310 pounds of pure rock phosphate make 234 pounds of acid phosphate and 264 pounds of calcium nitrite, both of which are soluble. Thus 56 pounds of nitrogen, when oxidized to nitrous acid, have power to dissolve 62 pounds of phosphorus and 120 pounds of calcium, contained in rock phosphate. If the nitrite bacteria bring about the reaction shown by the equation, both calcium and phosphorus are thus dissolved from raw rock phosphate. The bacteria need the calcium to neutralize the nitrous acid produced, and a small amount of both calcium and phosphorus is needed for their own bodies.

Carbon dioxid (CO_2) is produced in large amounts in soils by bacterial action on proteins, sugars, starches, fiber, and other compounds. It is exhaled by bacteria in respiration just as by man. It has been found that one pound of non-symbietic nitrogen-fixing bacteria (Azotobacter) exhaled 1.27 pounds of carbon dioxid in 24 hours. A man weighing 150 pounds and doing hard muscular work exhales only 3.74 pounds of carbon dioxid in 24 hours. The enormous production of carbon dioxid by soil bacteria is due to their feeding upon easily oxidizable carbon and to their rapid multiplication. It is well known that manure and crop residues added to the soil greatly increase the carbon dioxid produced, as these materials are good food for bacteria. In one case a normal application of manure increased the carbon dioxid produced 33 per cent. Very little carbon is retained by the bacteria compared to that given off.

The carbon dioxid produced by bacteria is absorbed in the soil moisture and when in contact with raw rock phosphate will dissolve it according to the following equation:

$$4H_2\ CO_3+Ca_3\ (PO_4)_2 = 2Ca(HCO_3)_2+CaH_4\ (PO_4)_2$$

According to this, 176 pounds of carbon dioxid make 62 pounds of phosphorus soluble.

It is a simple matter to show the solubility of raw rock phosphate in water saturated with carbon dioxid. This was accomplished as early as 1868 by Knop. However, when soil is treated with carbonated water for long periods, only relatively small amounts of the phosphorus present can be found in a soluble form; and when bacteria which produce carbon dioxid in large amounts are allowed to act in soils, not much soluble phosphorus is produced unless large applications of carbonaceous material have been made for the bacteria to feed upon. When this is done a more appreciable solubility is found.

Conditions are seldom favorable for more than a small portion of the carbon dioxid produced in the soil to act in the liberation of phosphorus from raw rock phosphate. Much of the carbon dioxid is dissipated in other ways and the greater portion returns to the air, it being a very volatile compound. This is evident from the work of Krober, who found under very suitable conditions that it required the production of 122 pounds of carbon dioxid to liberate one pound of soluble phosphorus from pure rock phosphate.

It has been known that plants excrete carbon dioxid from their roots. Kossowitsch found that the roots of mustard plants produced large amounts of carbon dioxid during a growing season. Stocklasa studied the production of carbon dioxid from wheat and clover roots and found that the daily production was much greater with the clover than the wheat. The effectiveness of carbon dioxid excreted by plant roots depends upon the number of plants per acre, the kind of plant, and the kind and amount of phosphate applied. The larger the application, the greater the contact with the plant roots. It has been demonstra-

ted by investigation with pot cultures at the University of Illinois that common farm crops possess some ability to utilize rock phosphate without organic matter, and that their ability to do this is increased by increased applications of the rock phosphate. It has also been shown that cereals possess this ability as well as legumes.

Rain water is another source of carbon dioxid, becoming charged with gas from the air, in which there are four parts in 10,000; and such water possesses power to dissolve minerals, such as rock phosphate. That carbon dioxid is an important solvent of minerals is well understood.

Solubility of Phosphates by Organic Acids.

The acid of vinegar (acetic), of rancid butter (butyric), of sour milk (lactic), and many other similar acids result from bacterial and mold action on carbohydrates, proteins, and fats in the soil. These acids may act on phosphates and render them soluble. They are much stronger in their action than carbonic acid and weaker than nitrous or nitric acid. They are produced in very small amounts compared with the production of carbon dioxid, but perhaps in larger amounts than nitrous acid. The percentage of phosphorus made soluble by these acids is probably higher under similar conditions than that made soluble by carbonic acid. Sackett, Patten, and Brown, of the Michigan Agricultural Experiment Station, and Kock and Krober of Germany have shown that soil bacteria which produce organic acids made large amounts of bone meal and raw rock phosphates soluble. The addition of limestone with the insoluble phosphates presents the detection of soluble phosphates. The undesirable condition created by the intimate contact of ground limestone and rock phosphate in the soil is largely avoided by the methods of application recommended by the Illinois Station.

Importance and Extent of the Action of Nitrite Bacteria.

It has already been shown that the nitrite bacteria make phosphorus and calcium soluble from pure rock phosphate, and that the action conforms to a definite chemical ratio.

The nitrous acid produced may act on compounds of iron, aluminum, potassium, sodium, or magnesium which occur in soil, or may act upon tricalcium, phosphate, calcium silicate, or calcium carbonate, if present. For this reason, it has been recommended that the ideal practice to obtain the greatest solubility of the raw rock phosphate is to turn it under in intimate contact with organic matter, and, if needed, to apply ground limestone after plowing or at some other point in the crop rotation.

The role the plant plays in this process of utilizing natural food materials is highly important; it acts as a pump, removing from the soil the soluble phosphorus, calcium, and nitrogen, as they are formed, thus giving room for more soluble phosphorus, calcium, and nitrogen to be formed. Under these conditions the bacteria are stimulated to put forth their best efforts. When the soluble nitrogen, phosphorus and calcium accumulate they probably tend to reduce the activity of the nitrite bacteria, because bacteria do not thrive, as a rule, in an excess of their own product, but fortunately their action never ceases while suitable conditions exist.

BIBLIOGRAPHY.

1. Dental Review, November, 1906.

2. Cyril G. Hopkins and Albert L. Whiting, Bulletin No. 190, University of Illinois, Agricultural Experiment Station.

Discussion.

J. Leon Williams:

I have nothing to add to the extremely interesting and what I consider very

important paper; but with a view to the possibility of making a practical application of what I understand to be the teaching of the paper, I should like to ask the essayist—keeping in mind the economic aspect—whether he would recommend the use of the raw rock phosphate with the other materials—if the prospects are likely to be better than using either alone?

Dr. Hinkins: I am very sorry Dr. Gies, who was to open the discussion, is not here, because I put a great deal of work into this paper, and I was in hopes he would be able to enlighten you somewhat on what I intended to convey in the paper.

Where do we get this calcium phosphate from? It has been said: "No phosphate—no brains," and I think that pretty nearly holds good to-day. The object of reading this paper was to bring before you the importance of the standing of the dentist in this day of progress, and the fact that we have been put on an equal footing with the medical men in the army makes it necessary that we should know something about the elements of the calcium that makes up the constituents of the human body. As the mentality of a child grows, the phosphorus increases in proportion. In bright brains there is 96%. In brains of lower grade, it shows a smaller percentage.

There was an experiment started a while ago to show you the result with mice. There were five pairs of mice taken from the same family. One set was fed on whole wheat flour, another on the white flour which we use. The white flour of bread has less than four-tenths of one per cent of calcium phosphate, making the chemical analysis of teeth at 86%. You can see what the effect would be with less than four-tenths of one per cent. The mice fed on the white flour in a little while showed the effects of their ill-nourishment, and gradually died, lingering over three months; while the others, fed on the other flour, have increased in health and breeding and are doing well to-day; there are so many we do not know what to do with them.

On the action of the soil bacteria, I think it was Hopkins—but it may have been Thorpe—who said it took about twenty-three pounds of phosphorus to grow one hundred bushels of corn. Six pounds of that went to the stalk, and seventeen to the kernel. It also takes one hundred pounds of nitrogen out of the atmosphere, and it takes about twenty-seven to thirty pounds of potassium, which we get out of the earth. We have plenty of potassium in the earth, and plenty of nitrogen in the air, if we can only extract them; and as has been shown, the decomposition will produce this nitrous acid, which will break the calcium phosphate into mono- and tri-calcium phosphate.

Those are the soluble compounds, and I might say to Dr. Williams that right here one of the reasons we have so much trouble with our cement fillings may be because the breaking up of the mono-phosphates into the tri-phosphates. We cannot hold them there. That may be the trouble with the phosphate cement fillings.

The work of Hopkins and Whitney has shown us that we must know something about the assimilation of the calcium phosphate from the mother earth by human beings, so we can tell our patients what to eat. We must be teachers, and I am trying to present this subject to you in a feeble way, I know it is poorly presented, but it is the best I can do. If a dentist is asked by a patient: "What shall I eat?" what will you tell him to use? Hosford's Acid Phosphate, or Graham flour, or wheat flour, or white flour? The whole wheat and the Graham flour are practically the same. To grow one hundred bushels of oats, it takes fifteen pounds of phosphorus, three to the straw and twelve to the

kernel. Wheat is about sixteen or seventeen in the same proportion. So you can see that the phosphorus is absolutely essential if we want to develop the human race, and have any bone or brain matter.

Now, as to the question of nitrogen. We hear so much about bacteria—about the streptococcus viridans, etc. I believe if we had the proper diet—with what I have heard, and seeing these results of the agriculturists—we would have less fermentation. We would have better peristaltic action, and better and stronger systems. Look at the action of nitrogen, and study it a minute—what is the atmosphere composed of? Four-fifths of the atmosphere is nitrogen. I have told you how important it is to break up these compounds. We breathe in four parts of nitrogen, and one of oxygen. Does it seem possible when we are full of nitrogenous compounds that we will liberate it, and the oxygen will come out as carbon dioxide—when hydrogen and nitrogen break up into ammoniacal compounds?

It produces poisonous cyanides, while oxygen produces nitrates. If we knew more about the enzymes, or the acids or alkalies formed by bacterial fermentation, we would not have so much trouble with the bacteria, if we would only treat the matter intelligently.

Dr. McAlphin, of Bradford, Pa.: What was the condition of those teeth from the results of whole wheat flour?

Dr. Hinkins: The experiment was not of long enough duration. It was started last February and the first of the family was all gone. They were in such a state of aroma during that hot week, that I did not care to tackle them further.

Dr. McAlphin: Do you consider it necessary to have a diet of phosphorus after they are fully developed?

Dr. Hinkins: It was done only to show whether the whole wheat was better than the other. As I understand from the millers, if they leave a certain percentage of phosphates in the white flour, it turns yellow. I did not pay attention to the teeth, because when they were dying, I did not care to tackle them, and I was busy at that time on the exemption board, trying to get soldiers for Uncle Sam.

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Editorial Department.

TEN THOUSAND DENTISTS TO BE COMMISSIONED AND ASSIGNED BEFORE JULY 1, 1919.

Surgeon General Gorgas called a conference of the Dental Committee of the General Medical Board, Council of National Defense, and the Deans of the dental schools, at Washington, Wednesday, September 11, 1918. The purpose of this conference was to discuss the present status of the dental service of the United States Army and dental education as influenced by present war conditions.

Announcement was made at this conference by the various repre-

sentatives of the War Department that authorization had been secured for the commissioning and assignment before July 1, 1919, of between nine and ten thousand (9,000 and 10,000) Dental Officers. The total number of dentists holding commissions on September 3, 1918, was five thousand, nine hundred eighty-one (5,981) while the present number of Dental Officers on duty on this date was three thousand, five hundred (3,500). The present authorization will therefore call for the commissioning before June 1, 1919, of at least three thousand (3,000) additional officers, in fact there will probably be commissioned five thousand (5,000) officers by June 1, 1919.

Colonel Wm. H. G. Logan, to whom the dental profession is indebted for this special order, announced that examinations for dentists desiring commissions in the Dental Corps* of the United States Army will be opened in the immediate future for such dentists as are now or may hereafter be acting as Privates in various camps in this country and with troops overseas. Commissions will then be granted to the successful candidates as vacancies exist for the assignment of additional Dental Officers for the strength of the Army on that date.

In reference to civilian dentists who are at home and desire commissions in the Dental Corps and are of conscription age, and registered on September 12, 1918, no authority exists at this time for granting commissions to men who have not been inducted into military service. Should the regulations change and permit the commissioning of men, subject to draft, before being inducted into the military service, a decision will be reached upon commissioning such conscripts.

However, the only positive statement that the department can make at this time in reference to this question is, so long as we have conscripted dentists in camp acting as Privates, that examinations will not be open for dentists of conscript age who are at home. Vacancies existing for the assignment of Dental Officers will first be filled from among those who now hold commissions and desire active duty; second, men who have secured commissions and are acting as Privates. We would urge many of the men who were commissioned in the Dental Reserve Corps and have not been called for active duty, not to ask for immediate service when the opportunity is offered. Under the new regulations referred to above, hereafter there will be no Dental Reserve Corps. Thus, it would seem imperative that some men now holding commissions voluntarily help the department to automatically maintain a reserve corps by not asking for immediate service. If a Dental Officer

*The term "Dental Reserve Corps" by recent act has been discontinued and hereafter all dentists serving in the United States Army are referred to as members of the Dental Corps, U. S. A.

on inactive duty does not ask to be placed on active duty, he will be permitted to remain in a reserve status for six or nine months.

Every man who graduated in the 1918 class and others who have not received commissions will very soon be given the opportunity of taking an examination for a commission. However, the procedure will be thru military channels. If a dentist is called into service as a private thru his draft board, he should immediately make application to his commanding officer asking to be assigned to the Medical Department.

By special order of the War Department, one Dental Officer will be assigned to each five hundred (500) of the average total strength of our troops in training in the various camps of the United States.

Three (3) Dental Officers allowed for each one thousand (1,000) Bed Hospitals in the United States.

Two (2) Dental Officers allowed for each Base Hospital for overseas service.

One (1) Dental Officer allowed for each Evacuation Hospital for overseas service.

The number of enlisted men to serve as Dental Assistants and Dental Mechanics is in excess of the number of Dental Officers to permit the assignment of four (4) enlisted men of the Medical Department as Mechanical Dentists, three (3) for the camp organization and one (1) with each hospital located in the United States. This will make it possible to rapidly construct all the partial dentures needed.

Dental Assistants are authorized in the same grades and percentages within the grades as allowed for the enlisted men of the Medical Department up to and including the grade of Sergeant of the First Class.

This authorization from the Adjutant General securing the commissioning and assignment of nearly 10,000 dentists to active duty with an army of 4,500,000 was secured in compliance to a request from the Surgeon General.

THE STUDENT ARMY TRAINING CORPS.

The Student Army Training Corps has now become an actuality. Units have been and will be established at a large number of colleges and universities. Colonel Robert I. Rees, a member of the General Staff and Chairman of the Committee on Education and Special Training, appeared before the Deans and College Committee at the conference in Washington on September 11, 1918, and announced that all dental schools which were designated as well-recognized in the Surgeon General's office

will be permitted to make application for the establishment of the Student Army Training Corps Unit for men eighteen (18) years of age and over, who desire to study dentistry, and each school was advised as to the number they would be permitted to enroll.

While no decision has been reached by the War Department as to whether or not students who are enlisted in the Medical Enlisted Reserve Corps will be immediately transferred to the Student Army Training Corps, yet such announcement will be made in the very near future. All students matriculating in dental schools and making application for the Student Army Training Corps will be voluntarily inducted into service as soldiers in the United States Army on October 1 to 15. Men registered in class 1A may enlist in the S. A. T. C. after October 15.

Students in the Student Army Training Corps will receive from the Government housing, sustenance, uniforms, free tuition and the pay of a Private ($30.00 per month). Officers' uniforms, army cots, blankets, rifles and such other equipment as may be available will be furnished by the War Department. There has been no special announcement as to whether the Government is to buy the instruments and books for the members of the Student Army Training Corps. We doubt the advisability of the Government taking on this phase of the expense. All study and recreation hours will be under military supervision as a Military Director will be placed in charge of each Unit, as well as a member of the Medical Staff. The students in the Student Army Training Corps will not be asked to act as cooks or dish washers. Each school must secure drill grounds in close proximity to the institution as all students must receive not less than six (6) hours per week of military drill.

Examinations will be given every three months on military and professional subjects and those who fall below an established grade will be dropped from the professional training and sent to camp for general military service. Students in the Student Army Training Corps will live under exactly the same military discipline, as far as possible, as all other enlisted men in the various camps.

It is assumed that there will be no vacation period for the students belonging to the Student Army Training Corps. However, it is possible that the professional instruction will not be continuous as all such students may be taken to camps for more extensive general military training during a portion of the usual summer vacation period. Nevertheless, it may be found necessary, in spite of this intensive training, to consume more than thirty-two (32) teaching weeks to cover the

normal professional course to make up for the time given over to military drill and military lectures.

Colonel Rees announced that male students who are physically unfit for military service and foreign students who desire to do so may purchase their own uniforms and receive the military training.

In reference to status of dental teachers, the local board must be notified by the Dean of the school that a teacher is essential and request that he be permitted to be so classified as to be exempt from the draft and kept in the dental school. To be an essential teacher, one must put in from twelve (12) to eighteen (18) hours per week or be a one-half time man.

General Robert E. Noble announced that it is necessary that dental colleges be maintained on such a basis as outlined by the Department in order to maintain the inflow of dentists needed to sufficiently take care of the army and civilian life.

The plan adopted for the Student Army Training Corps will apply also for young men for the Navy. Students who have been enrolled in the Navy and who were eighteen (18) years or older on September 12, will be organized into naval units, the minimum number for each being tentatively fixed at thirty (30). Naval officers will be assigned to duty at the large institutions, when and where officers are available, and at smaller colleges where it is impracticable to assign a naval officer, the naval students will be under the command of the army officer attached to the school who will be designated as the representative of the Navy for the purpose of supervising these students. Young men who are, or may later be enrolled in the Navy, or Naval Reserve, will receive the pay of a seaman, second class, their clothing outfit and a subsistance allowance which will not exceed $2.00 a day, out of which they must pay for their board and room, as well as the tuition fees. In this respect the arrangement is different from that of Army students, in that the young soldier receives the pay of a Private, a clothing allowance, and his subsistence in kind while at college, his tuition being taken care of by contract with the War Department.

The primary purpose of the Student Army Training Corps is to utilize the executive and teaching personnel and the physical equipment of the colleges to assist in the training of our new armies. From the standpoint of the dental college, this imposes a great responsibility but, at the same time, creates an exceptional opportunity for a dental institution to become an essential cog in this great patriotic, military and Governmental machine. Out of this cooperation between the Government and the dental school will come forth a more proficient dentist with a higher professional standard—conserving and maintaining the welfare of civilian life and the highest efficiency of the United States Army.

KEEP YOUR LIBERTY BONDS.

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UNITED STATES TREASURY DEPARTMENT.

Army and Navy

LETTERS FROM FRANCE.

My Dear Doctor King:

Your letter of May 25th received and I was very glad indeed to hear from you. This is the first letter that I have written home for the past two months as my time is occupied from 8:30 in the morning until 5 and 6 at night, seven days a week. You know we are running a Dental Section of the Army Sanitary School and putting a class of from 25 to 30 men thru every two weeks, which means keeping ones nose to the grind stone. In this connection I want to say that I don't think that I have seen a better spirit among men than is exhibited by every soldier in the American Expeditionary Forces. There is no complaint except that they are not allowed to go to the front, and with such a spirit predominating, I think the Huns will find that they are going to have their hands full when we throw our full weight into the line. The Dental officers that we come in contact with at the school, and see most of them coming over, are certainly to be complimented on their attitude and cooperative spirit and while the work here is very hard this spirit of cooperation is of such a nature that it makes hard work a pleasure. I am more than ever proud of our men and in this connection I am sending you a clipping which no doubt will interest you as Dr. Osborne is a member of the Regular Navy Dental Corps attached to the Marines.

There is one request that I would like to make of you in which you can do your bit for the corps here and which I will have to put as a personal request and not an official one. We are very anxious to get some lantern slides on oral hygiene and a moving picture or two for instruction purposes at the school and also to be sent out from the school and used to illustrate lectures given to the men. I have just found out that if you send moving picture films you will probably have to send them by express as the postal regulations do not allow them being sent by mail. We have a very fine cinema machine with lantern slide attachment, but no slides or reels to use. I am enclosing you two letters which might be of service in obtaining these unless you have some other means of obtaining them, and if you will have these sent to us at American Postoffice No. 714 as soon as practicable you will be doing your bit for us over here. I am not specifying the type of films or slides that we desire, but anything that is instructive on oral hygiene will answer the purpose. These can be packed in packages, not over seven pounds and sent by mail. We have a great opportunity over here to teach a great many of our younger men

the necessity of practicing their profession scientifically instead of empiracly and teaching them the proper perspective young professional men and old ones for that matter, should have.

With kindest and best wishes, I am

Fraternally yours,

S. D. BOAK, Dental Section,
Army Sanitary School A. P. O., 714.

A. E. F., August 20, 1918.

Dear Doctor King:

Timely the opportunity to write you has presented itself after my seeming neglect. Today I received The Journal of the National Dental Association, the greatest Dental publication in the world, and it was like some one opening a window in a close and stifling room to have an opportunity to read its refreshing and interesting contents "over here" —four thousand miles from the point of publication.

Our Unit left the training camp at Fort Des Moines on July 4th on a special troop train—thirty-five officers and the entire enlisted personnel—and after a few rather strenuous but pleasant days arrived at the Port of Embarkation. There we recuperated and prepared for overseas service. After a few interesting days at this eastern camp and a visit to the city we went on board ship.

Fortunately ours was one of the larger ocean liners and we were in a great convoy of ships. There were two base hospitals, a field artillery, many casual officers and nurses on board ship. It was about 12:00 M. before we left the harbor and in a few hours we were sailing down the Hudson and full speed across the Atlantic. The sight of a large convoy of ships, well patrolled by cruisers, submarine destroyers, hydroplanes and derigibles, has a lasting impression. The camoflaged ships plowing their way thru the ocean loaded with the American soldiers is a picture beyond comprehension.

The voyage across the sea was very pleasant and uneventful, except when entering in the war zone there is always some anxiety and excitement of the ever active submarine. After thirteen days we were given permission to remove our life savers that have been worn every day and all lightless nights, as we were nearing an English port. There we anchored until a train was prepared to take us across England to another port where we again went on a ship and sailed across the English Channel for a French port. There we disembarked and marched to a rest camp. Having rested for a few days we were taken out to some very interesting "promenades" and visited places of historical interest and old chateaus. Then came orders to move to the point of our destination and that evening we marched to entrain and traveled for many hours passing thru some of the largest cities of France and many beautiful villages and picturesque country, meeting train after train of American, French and other allied soldiers, some going to new fronts, others returning for a few days' rest. Everywhere the people were courteous and pleasant to the American soldier, determined and confident of winning the war, the end of which is becoming more visible in view of the recent victories of the American and Allied Armies.

After many hours of travel, we finally arrived at our point of destination—a big base hospital center. This base hospital center is located in a valley of a beautiful river on one side, and mounts and forests on the other. It is in the southeastern part of France and near several beautiful villages. The climate is ideal—days are warm and the nights are cool. The food has been excellent and rivals the best mess of the Base Hospitals of America. We live in wooden barracks, and each man builds his own furniture and arranges his quarters to his own taste of the available timber he can find.

My duties since arriving here have been many and varied. Besides my reg-

ular duties as Dental Surgeon, I am a Fire Marshall in one section of the Hospital Center, assist censoring mail, and last but not least, am Officer of the Day when my turn comes in my particular Unit. So you can readily understand that my time is well occupied in helping to do my bit.

There are now three of the Hospital Units at this Center, and the Center when completed will accommodate ten Units under one Commanding Officer.

The Dental Department when fully completed will be one of the important branches of the Hospital, as there is a great demand for dental service, for the "blessured" men who come here for treatment from the front, and the importance of dental attention is well understood and recognized by all the personnel of the Army.

I will enclose a clipping of today's front page of the "Stars and Stripes," a paper published in Paris for the American soldier in the A. E. F. It will show in a measure at least that the importance of the prophylaxis of the teeth has not been overestimated, and that the campaign of education carried on by the American dentist has not been in vain. On two occasions I have been detailed to speak to the entire personnel on the care of the teeth.

Hoping you will continue to send The Journal, and regretting that I was unable to attend the National Dental Convention at Chicago this year and that I am unable to tell you more of the interesting things about the War as such information is very limited, I am,

Respectfully yours,

GEORGE M. BOEHLER,
1st Lieut. D. R. C.,
Base Hospital No. 49,
A. P. O. 717, A. M. F.

COLLEGE TRAINING FOR NAVY.

Plans adopted for the students' army training corps will apply also to young men for the Navy. Students who have been enrolled in the Navy and who were 18 years of age or older on September 12 will be organized into naval units, the minimum number for each being tentatively fixed at 30. Naval officers will be assigned to duty at the large institutions, when and where officers are available, and at smaller colleges, where it is impracticable to assign a naval officer, the naval students will be under the command of the Army officer attached to the school, who will be designated as the representative of the Navy for the purpose of supervising these students. Young men who are or may later be enrolled in the navy or naval reserve will receive the pay of seaman, 2d class, their clothing outfit, and a subsistence allowance, which will not exceed $2 a day, out of which they must pay for their board and room, as well as the tuition fees. In this respect the arrangement is different from that of Army students, in that the young soldier receives the pay of a private, a clothing allowance, and his subsistence in kind while at college, his tuition being taken care of by contract with the War Department. The course of instruction for the naval student is three months, with the possibility in exceptional cases of continuing for a more thoro course. It will be seen, therefore, that these young men are not given a free university education, but rather an extensive course of instruction which will fit them for entry into the various officer-material schools, after passing the required examinations. The courses, which are based upon the plan adopted by the Army, are prepared with a special view of enabling these young men to acquire in a few months the essentials of an education which will enable them to pass later into the schools for line officers, both deck and engine room, aviation, or the pay corps. These units will probably be known as the Navy section of the students' army training corps. The plan is by no means new, as several large colleges as early as

the spring of 1917 offered their facilities to the Navy, many of which were accepted. Several rear admirals especially interested in collegiate work, notably Rear Admirals Chester, Edwards, and Goodrich, have been detailed to duty with the larger universities. While it is the intent of the plan to develop officer material, no promise is held out to any students that they will be made officers; many will only get as far as the trade schools for the enlisted ratings. Students who were not 18 on registration day (September 12), and others in a civilian status, may be permitted to join these naval units, at their own expense, but subject to the discipline which governs the organization. Medical and dental students enrolled in the naval reserve force who are at colleges where there is a student army training corps will wear the uniform and draw the allowances of the Navy students. They will be enrolled in the hospital corps of the Navy and will be subject to the discipline of the corps, under the orders of the naval officer if present, and if there be no naval officer, then of the Army officer commanding. In sections and at the smaller colleges where the number of naval students is too small to warrant the establishment of special courses it is probable that such students will be combined with those attending a large institution, where the facilities for the naval courses have been provided. — *Army and Navy Register, Sept. 14.*

STUDENTS' ARMY TRAINING CORPS.

1. After a student has been registered by his Local Draft Board and has entered, in the regular way, a College—to be chosen by himself, not by the government—he may be voluntarily inducted into the Students' Army Training Corps. As this is a Corps of the Army, he will become a soldier at once and be placed on active duty upon his induction. He will receive uniforms (to be worn all the time), equipment, food, (army rations), housing (in barracks) and instruction at government expense, and the pay of a private ($30) per month. As he is a soldier he is no longer under the jurisdiction of his Draft Board, but he is subject to all military orders and liable to any military duty.

2. All men within the present draft ages (18-45), with the exception of general service men in Class I registered before September 12, 1918, are eligible to voluntary induction into a collegiate section of the S. A. T. C. They must also be shown by the usual Army physical examination, to be held at the College, to be physically fit for general or limited military service, and have had a four years' High School course or its equivalent, and be in attendance at one of the institutions maintaining an S. A. T. C. No general service men in Class I who registered under the first draft law (i. e. before September 12, 1918) are eligible to induction into a collegiate unit of the S. A. T. C., but men already inducted into or called for active service may seek transfer thru their commanding officer and the regular military channels. Such transfers, however, will be made only in rare and exceptional cases.

3. Boys under eighteen years of age who have been admitted to College will be given such military training as is possible, but they will not become soldiers, and hence will not receive subsistence or pay from the government, until they have become eighteen years of age, have registered with their Local Draft Board and have been inducted into the S. A. T. C.

4. Boys under eighteen years who are in High or Preparatory Schools should remain in school and intensify their study in order to complete their High School course and fit themselves for entrance to College as soon as possible.

5. Collegiate units of the S. A. T. C. will be established at institutions of approved academic standing enrolling 100 or more able bodied male college grade students eighteen years of age or over.

6. It is expected that the voluntary inductions into collegiate units of the S. A. T. C. will take place about October 1st. Students must pay their own expenses until inducted into the S. A. T. C.

7. Information concerning the routine of voluntary induction should be obtained from commanding officers of collegiate units of the S. A. T. C.

8. An arrangement is now pending which will provide that a limited number of men may, upon induction, be assigned to the Navy if they so desire.

9. Vocational units of the S. A. T. C., which have been in operation for several months as National Army Training Detachments, will be continued at the institutions at which they have been established, but new units will not be added at present. Registrants of the new draft ages who have had a grammar school course or its equivalent are eligible for induction into these units. Induction will ordinarily be sought, however, only thru the Local Draft Board of the registrant and not thru the institution at which the unit is established. Men seeking induction will be sent to vocational units only so far as the requirements of the service permit.

10. As enlistments have been discontinued, it is only by voluntary induction that a registrant may enter any branch of the army.

COMMITTEE ON EDUCATION
AND SPECIAL TRAINING.
(General Staff.)

September 11, 1918.

STUDENTS' ARMY TRAINING CORPS.

The course of study for student soldiers of the students' army training corps now being organized in the colleges of the country as an active branch of the Army is announced as follows by the committee on education and special training of the War Department:

In the curriculum of the students' army training corps the average number of hours each week will be as follows: Subjects including practical and theoretical military instruction and physical training, 11 hours a week; allied subjects, including lectures, recitations, laboratory instruction, and the preparation needed for such work, 42 hours a week.

These hours are set forth with reference to the normal course period. In the case of students who have had at least one year at an approved institution, during which they have specialized in studies which form part of the preparation program for chemical warfare, medical corps, engineer corps, the ordnance corps, or other technical branches of the service, the committee on education may authorize a reduction in the hours of military training to not less than six hours a week. This is only in the event that an additional number of hours be given to the study of technical subjects.

Ordinarily, the allied subjects selected for the students' army training corps will be English, French, German, mathematics, physics, psychology, chemistry, biology, geology, geography, topography and map making, meteorology, astronomy, hygiene, sanitation, descriptive geometry, law, military law, and government. Permission may be given for the recognition of one other subject, provided that it requires not more than three hours a week in lectures and recitations.

The presidents of the colleges which have been authorized as units of the S. A. T. C. were advised that the collegiate section is confined to students graduated from standard four-year secondary schools or students having the equivalent or such educational qualifications. —*Army and Navy Register, Sept. 14.*

THE STUDENTS' ARMY TRAINING CORPS.

The Students' Army Training Corps, to which reference has already been made in The Journal,[1] has now become an actuality. Units have been established at a large number of colleges and universities. A statement issued by the Committee on Education and Special Training of the War Department urges that every young man who has been planning to go to college this fall should enter the institution of his choice, matriculate and enter as a regular student. Of course, he will have registered on September 12, as required of all other men of draft age, but this will not prevent his enlisting in the Students' Army Training Corps, into which he will be inducted about October 1. By this voluntary induction the student becomes a soldier in the United States Army; he will be placed in uniform, be subject to military discipline, and will be given the pay of a private. The government also pays his tuition, housing and subsistence. Each college is provided with officers, uniforms, rifles and such other equipment as may be necessary, and essential teachers will be retained so far as possible. The student soldiers will be given military instruction under officers of the Army and will be kept under observation and test to determine their qualifications as officer candidates and technical experts, such as engineers, chemists and physicians. After a certain period, men will be selected according to their accomplishments and assigned to military duty. A student may be assigned to an officers' training camp, to a non-commissioned officers' school, to a school for further intensive work in a specified line, or to a vocational training section of the corps for technical training of military value, or he may be transferred to a cantonment for duty with troops as a private. It is planned to have similar sortings and reassignments of men made at periodic intervals, probably at the end of each quarter, as the requirements of the service may demand. Students will not ordinarily be permitted to remain in the college units after the majority of their fellow citizens of like age have been called to military service. Exception to this rule will be made as the needs of the service require it in the case of technical and scientific students, who will be assigned for longer periods of study in specified lines. The technical students referred to are those taking courses in medicine, engineering and chemistry. A schedule of military work has been outlined, but this is not intended to preclude effective academic work. It will vary to some extent in accordance with the type of academic instruction taken; for example, it will be less in a medical school than in a college of liberal arts. Meanwhile, medical students in the Medical Enlisted Reserve Corps are to be called to active duty in the Students' Army Training Corps and be placed on the same basis as regards uniforms, tuition, board and housing. It is clear that premedical students are eligible for enlistment in the Students' Army Training Corps, but what disposition will be made of them is not yet clearly stated. They will be expected to remain at their studies, however, until called into active service.—*Editorial, The Journal A. M. A.*

[1]Medical Education and the War, Current Comment, The Journal A. M. A., Aug. 17, 1918, p. 568.

THE SELECTIVE SERVICE LAW AND PHYSICIANS.

Many letters have been received concerning the relation of the new Selective Service Law to physicians. A few of these letters have been selected to be answered in the Queries and Minor Notes department. It may be said that, as a general proposition, there is no difference between the new and the old Selective Service Law except as to the ages included and the slight broadening of the terminology concerning exemp-

tions. With special exceptions, all male persons who are above 18 years of age and have not reached their forty-sixth birthday on September 12 must register. The exceptions are those who have registered under the previous draft acts, whether or not called for service; officers and enlisted men of the Regular Army; officers appointed and men of the forces drafted under the previous draft act; "Officers and enlisted men of the National Guard while in the service of the United States; and the officers of the Officers' Reserve Corps and enlisted men in the Enlisted Reserve Corps while in the service of the United States; and officers and enlisted men of the Navy and Marine Corps and officers and enlisted and enrolled men of the Naval Reserve Force and Marine Corps Reserve while in the service of the United States." As we have stated before, there are in the United States 75,000 physicians, including those already commissioned, under 46 years of age. The question of greatest interest is the disposition of physicians after their registration. There is nothing in the bill, as we read it, that provides for any different method of applying the selective service principles than that which has heretofore governed the disposition of those under 31 years of age. The Selective Service Boards are the only bodies empowered under the law to grant exemptions. Undoubtedly special regulations concerning physicians will be promulgated by the Provost Marshal-General. It is quite probable that in formulating these regulations the Provost Marshal-General will consult some or all of the Surgeon General's of the various services. As we stated last week, the problems of adequately providing for the medical needs of the Army and Navy and of the civil population are more complex than those affecting any other occupation, because of the great demand and the somewhat limited supply. Last week we outlined these demands, and it is not necessary to repeat them. The one question asked in most of the letters received is, What constitutes dependency so far as physicians are concerned? It has been suggested that physicians could not advance a plea for exemption on the grounds of dependency, since they are eligible for a commission, which would give an income sufficient to support a small family in fair circumstances. Local boards in some communities have refused to exempt physicians on the grounds of dependency for this reason; on the other hand, the opposite principle has been carried out by other local boards. In view of the large number of physicians now affected, these matters will no doubt also be considered in the special regulations concerning physicians. — *Editorial, The Journal A. M. A., Sept. 7.*

NAVAL DENTAL CORPS.

On November 11 will be held an examination of candidates for appointment to the regular dental corps of the Navy. This examination, which will be held simultaneously at Washington, Great Lakes, Ill., and at Mare Island, Cal., is for the purpose of filling 56 vacancies, and will be open to dentists between 21 and 32 years of age, provided they are not in Class One of the draft; only men in deferred classifications will be considered. On October 14 an examination will be held for promotion of dental officers, and also for the appointment of those who have been in a probationary status. As a result of this examination, it will be possible to advance thirty dental surgeons to the grade of lieutenant, twenty-eight of whom may be promoted to the temporary grade of lieutenant commander. This examination will be competitive, since the candidates are now serving a probationary period, and have no seniority. After qualifying in the forthcoming examination they will be assigned a place in the register. A training school for the naval dental corps has been established at the training station,

Great Lakes, Ill., with Lieut.-Commander Anson F. McCreary, dental corps, in charge, for the benefit of young officers of that corps. The course will comprise both military training and professional instruction. The course, for the present, at least, will be open only to those who have been commissioned. The old dental reserve corps passed out of existence with the appropriation action of July 1, and was superseded by the dental reserve force; members of the former corps having been required to enroll in the reserve force before being assigned to active duty. The age limit in the dental reserve is 21 to 49.— *Army and Navy Register, Sept. 28.*

EXAMINATION FOR ARMY DENTISTS.

An examination will be held thruout the country on November 4 for appointment to the Army dental corps. Approximately 70 vacancies are to be filled. An examination of privates of the Army, who are graduate dentists, will be held within the next thirty to ninety days. Some of these men are already in the dental corps, but many of them are performing regular military duty in the various arms of the service. Their names have been assembled from the registration cards of the National Army, and it is estimated that about 400 in all are eligible to take this examination. These men will be given the first opportunity to fill vacancies, and those members of the former dental reserve corps, now in an inactive status, will be called to active duty as needed, probably after January 1. Under the orders now in force, no men are issued commissions except as vacancies occur and their services are needed.— *Army and Navy Register, Sept. 28.*

LOCATING THE SOURCE OF TRENCH FEVER.

Perhaps the best piece of work that has been done in medical research since the work began has been done by the Research Committee of the American Red Cross in Paris. The Committee has definitely located the source of trench fever and has found a successful means of combating it. Trench fever is not a serious disease but, heretofore, it has put many men out of commission. At the Medical Headquarters of the American Red Cross in Paris, the writer of these notes was informed that altho the source of the disease had been suspected before, it had remained for this Committee to prove it. Some medical men thought it might be typhoid or paratyphoid. Trench fever is now known to be communicated by the bites of trench lice. In the experiments to delimit the source of the contagion 35 to 40 American soldiers offered themselves for experimentation. A group of the men who were in perfect health were subjected to the bites of infected lice and speedily developed trench fever. Uninfected lice were then permitted to bite patients suffering with trench fever and from these patients transferred to the bodies of well men who in turn developed the fever. As a result men from the trenches are bathed and their clothes sterilized so that the disease-carrying lice are destroyed. It has been proved that a man will carry the virus of trench fever in his blood for as long as three months and lice having access to his body within that time may become infected and transmit the disease to others. An officer of the Committee pointed out that great care should be taken to prevent the development and spread of trench fever by returned soldiers thru the tenement districts of the large Eastern cities of the United States, hotels or lodging houses where insects might be infected by men who had apparently recovered. With the precautions that are being taken the danger will be minimized, but it is just as well to bear it in mind. Facilities for cleanliness and disinfection on the front now surpass any in the past four years and the U. S. Medical Corps has taken vigorous meas-

ures to combat trench fever. The men who had gallantly offered themselves for the experimentation which resulted in the determination of the source of trench fever have been accorded special distinction.

MEDICAL STUDENTS AND THE DRAFT.

The Provost-Marshal-General has addressed the following telegram to the draft executives of all states:

"It has been brought to the attention of this office that many Local Boards are calling registrants for induction who had enlisted in the Enlisted Reserve Corps of the Medical Department under Section 151, Old Registrants, on mistaken assumption that under telegram Number B2546 such enlistment held the registrant in Class V only until September 16.

"Registrants who enlisted in the Enlisted Reserve Corps of the Medical Department as aforesaid should be held in Class V and should not be confounded with registrants who enlisted for special training in camps and schools for a limited period expiring September 16, referred to in Telegram B2546. Please communicate contents of this telegram to all Local Boards. CROWDER.

ARMY MEDICAL CORPS NOTES.

There have been no developments respecting the selection of Army medical officers to fill the vacancies created by Congress in the grades of major general and brigadier general. Lieutenant Colonel Charles F. Morse, of the Regular Army and in charge of the veterinary corps, has been promoted to the grade of colonel, as has Lieutenant Colonel Samuel J. Morris, in charge of the training camps, in the surgeon general's office. Colonel Williard F. Truby, upon being relieved in command of the Walter Reed Hospital, will be assigned to the sanitation divisions of the surgeon general's office. The dental reserve corps is filled, and no more appointments are being made. Members of this corps in an inactive status, of whom there are about 2,500 already holding commissions, are assigned as rapidly as their services are needed, preference being given, however, in assignments to members of the regular dental corps. With the rapid movement of troops thru training camps, the demand for dental surgeons has materially increased. So far as it is practicable, members of the dental reserve corps, as they are assigned to active duty, are first given a course of instruction at the training school at Camp Greenleaf, altho it depends somewhat upon the capacity of the school, there being accommodations for eighty a month.—*Army and Navy Register, Sept. 7.*

DENTAL CORPS ORDERS FROM WAR DEPARTMENT.

DENTAL CORPS.

Appointment of following first lieutenants to captains announced: Wall M. Billings, Wm. I. Setzekorn, John F. Ailworth, Gerald F. Stoodly, Bernard Ragland, Walter F. P. Zell, Edwin V. Morris, Herman J. Keyser, Daniel Jutton and Thomas W. Conly.

—Army and Navy Register.

Appointment of 1st Lieuts. Jackson H. Smith and Blake A. Sears to captains announced.

—Army and Navy Register, Sept. 14.

Col. Wm. H. Chambers from duty at general hospital 6, Fort McPherson, Ga., to Charleston, S. C., for duty as department dental surgeon.

Appointment of following first lieutenants to captains for existing emergency announced: Roy H. Kernohan, Harry L. Westney, Wm. H. Delbridge, James W. Simpson, James B. Eastman, Archibald R. Lucas, George A. Bullard, Edmund U. Potter, Page P. A. Chesser, Harold M. Whitney and Henry H. Thacker.

—Army and Navy Register, Sept. 21.

Appointment of following first lieutenants to captains for existing emergency announced: Lawrence K. Anderson, Leslie D. Baskin, Charles H. Brammell, George Krakow, Harry E. Smalley, Francis M. Tench, Richard K. Thompson, Wm. C. Webb, Jr., Theodore D. Grannick and Julius Seamans.

Appointment of First Lieutenants Arthur T. MacMillan and Clark J. Hollister to captains for existing emergency announced.

—Army and Navy Register. Sept. 28.

Announcements

NATIONAL SOCIETIES.

National Dental Association, October, 20-24, 1919, New Orleans.

National Association of Dental Faculties, New Orleans, October 20-24, 1919.

National Association of Dental Examners, New Orleans, October 20-24, 1919.

Xi Psi Phi Fraternity, New Orleans, October 20-24, 1919.

Association of Military Dental Surgeons, New Orleans, October 20-24, 1919.

Delta Sigma Delta, New Orleans, October 20, 1919.

STATE SOCIETIES.

October.

District of Columbia, October 15, 1918, Washington, D. C.

December.

Ohio, December 3-4-5, 1918, Columbus.

January.

Alaska, January 13, Cordova.

Hawaiian Islands, January 10, Honolulu.

March.

Vermont, March 19-20-21. Place to be announced.

April.

Alabama, April 7-8-9-10-11, Birmingham.

Connecticut, April 15-16-17, Hartford.

Michigan, April 7-8-9-10-11-12, Detroit.

Missouri, April 14-15-16, St. Louis.

Pennsylvania, April 29-30-May 1, Pittsburgh.

Texas, April, Waco.

West Virginia, April 9-10-11, Wheeling.

Kansas, April 14-15-16, Topeka.

May.

California Southern, May, Los Angeles.

Illinois, May 13-14-15-16, Peoria.

Indiana, May 20-21-22-23, Indianapolis.

Iowa, May, 6-7-8, Des Moines.

Massachusetts, May 7-8-9, Boston.

Nebraska, May 20-21-22, Omaha.

North Nakota, May, Fargo.

June.

Colorado, June. Place to be announced.

Florida, June 18-19-20, Tampa.

Georgia, June 11-12-13, Savanah.

Kentucky, June 9, 10, 11, 12, Louisville.

Maine, June. Place to be announced.

New York, June 12-13, Syracuse.

Utah, June, Ogden.

July.

Montana, July 24-25-26, Butte.

New Jersey, July. Place to be announced.

Wisconsin, July 8-9-10, Milwaukee.

October.

Louisiana, October, New Orleans.

Rhode Island, October, Providence.

DATES TO BE ANNOUNCED.

Arizona, Phoenix.

Akansas, Pine Bluff.

California State, San Francisco.

Minnesota, Minneapolis.

Mississippi, Clarksdale.

New Hampshire, Manchester.

New Mexico, Albuquerque.

North Carolina, Asheville.

South Dakota, Mitchell.

South Carolina, Columbia.

Tennessee, Nashville.

Virginia, Richmond.

Washington, Seattle.

OKLAHOMA BOARD DENTAL EXAMINERS.

The Oklahoma Board of Dental examiners will hold their next regular semi-annual meeting at the State Capitol Building, Oklahoma City, Okla., beginning December 9th, 1918. Reciprocally only with Kansas, Missouri, Arkansas, Nebraska, Indiana and District of Columbia. For further information address H. Overbey, Ryan, Okla., Sec'y.

MICHIGAN STATE BOARD.

The next meeting of the Michigan State Board of Dental Examiners will be held at the dental college, University of Michigan, Ann Arbor, Mich., November 18 to 23, inclusive. Applications and other information may be obtained by addressing.

B. S. SUTHERLAND, Sec'y-Treas.,
Owasso, Mich.

MISSOURI DENTAL BOARD.

The next meeting of the Missouri Dental Board for examining applicants to practice dentistry in Missouri, will be held in Jefferson City, beginning at 8 A. M. on Monday, October 14th, continuing for three days. For further information, write the Secretary.

V. R. McCUE, Secretary,
Cameron, Mo.

RHODE ISLAND BOARD OF REGISTRATION.

The semi-annual meeting of the Rhode Island Board of Registration in Dentistry, for the examination of candidates, will be held at the State House, Providence R. I., December 3rd, 4th and 5th, 1918.

Application, with fee, must be in the hands of the Board one week previous.

For further information address,

ERNEST A. CHARBONNEL,
139 Mathewson St., Providence, R. I.

INDIANA STATE BOARD OF DENTAL EXAMINERS.

The Indiana State Board of Dental Examiners will hold their next examination at the State House, Indianapolis, November 11 to 16th, inclusive, 1918. For application and information write Dr. H. C. McKittrick, Secretary, 605 Hume-Mansur Bldg., Indianapolis.

STATE OF WASHINGTON BOARD OF DENTAL EXAMINERS.

The next meeting of the Washington State Board of Dental Examiners will be held in Spokane, Wash. November 20th to 25th, 1918.

FRANK B. LYNOTT, Sec'y.

AN ORGANIZATION OF LIBRARIANS OF DENTAL LITERATURE.

During the meeting of the National Dental Association in Chicago, August 5-9, 1918, there was held a meeting of librarians interested in dental literature. A temporary organization was perfected. The next meeting of this organization will be held in New Orleans during the meeting of the National Dental Association.

A committee was appointed to draft a Constitution and By-Laws and report at the meeting in New Orleans. The temporary officers elected were as follows:

Dr. A. F. Isham, 85 N. Pearl St., Buffalo, N. Y., President. Dr. Isham is the Librarian of the Eighth District Dental Society of New York State.

Dr. G. H. Henderson, 5733 South Blvd., Cor. Menard Ave., Chicago, Ill., Secretary-Treasurer.

The membership fee is Fifty-Cents per year and all libraries interested in dental literature have an opportunity to become members of this society upon the payment of the annual dues.

The plan and purpose of this organization is to assist in the building up of libraries by exchange or duplicate copies

and in other ways assist to cooperate so that great centers of dental literature may be built up and maintained. Those interested in the success of this organization should communicate with the Secretary-Treasurer.

DR. G. H. HENDERSON, Sec.-Treas.,
5733 South Blvd., Cor. Menard Ave.,
Chicago, Ill.

MONTANA BOARD OF DENTAL EXAMINERS TO PASS THE JANUARY MEETING.

Owing to the present war conditions and the lack of a sufficient number of applicants, the Montana Board of Dental Examiners will not hold the usual January examinations. The next examinations will be held at Helena, Montana, on July 14, 15, 16, 17, 1919.

T. M. HAMPTON, Sec'y.

Book Review.

"The Composition of Certain Patent and Proprietary Medicines."—Compiled by John Phillips Street, Chemist in charge of Analytical Laboratory, Connecticut Agricultural Experiment Station. 274 pages; more than 2500 remedies; over 3100 analysis. American Medical Association, 535 North Dearborn St., Chicago. Cloth, $1.25 postpaid.

During the past few years hundreds of "patent" and proprietary medicines have been analyzed with the object of giving the public information that would be of vital interest to it. This work has been done by federal and state officials and especially by the chemists of the American Medical Association. The information, unfortunately, has been scattered thru many publications and, for this reason, has not been easily accessible either to the public or to officials. The purpose of Mr. Street's compilation is to remedy this difficulty, in a measure, by bringing together in one work an accurate record of published analyses. The book contains analyses (one or more) of over 2,500 proprietary medicines, including the most widely used and extensively advertised products offered to the American public.

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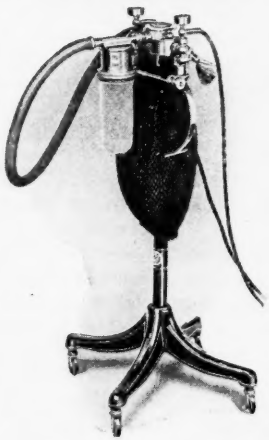

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